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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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PREVALENCE OF DISEASE

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PREVALENCE OF POLIOMYELITIS

The incidence of poliomyelitis in the United States declined during the week ended July 1, 1939, a total of 80 cases being reported by the State health officers as compared with 83 cases for the preceding week. The figure for the current week is much below the estimated expectancy of 158 cases based on the 5-year median.

Of the 83 cases reported, South Carolina with 29 cases, California with 16 cases, and Texas with 9 cases accounted for 67 percent of the total.

A summary of poliomyelitis incidence for the 4-week period May 21–June 17, 1939, is presented in the following article and accompanying table, and the current reported incidence by States is published each week in the Public Health Reports in the first table under the section headed "Prevalence of Disease."

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

May 21–June 17, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ending June 17, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—The incidence of poliomyelitis in South Carolina, to which attention was called in a previous summary,[1] has remained at approximately the same level for a period of 7 weeks ended June 17,

[1] Public Health Reports, June 9, 1939, p. 969.

with an average of 23 cases per week. Arizona reported 16 cases for the current period, as compared with none for the corresponding period in 1938, California 36 cases as against 6 last year, and Georgia 10 as against 2 cases. Three-fourths of the total number of cases reported (217) occurred in the 4 States mentioned. In other regions of the country the incidence was below the normal seasonal expectancy; and, although a rise in the number of cases of this disease is to be expected at this season of the year, the increases over the preceding 4-week period were small.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period May 21–June 17, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,022	1,260	1,487	3,236	2,120	2,120	48,249	79,893	79,893	140	220	363
New England	12	29	48	6	15	12	8,090	3,096	5,341	10	7	15
Middle Atlantic	208	237	311	36	29	40	8,382	24,521	18,292	58	54	64
East North Central	213	239	313	304	111	314	4,797	29,576	27,981	15	31	54
West North Central	60	78	114	138	63	157	3,225	5,235	5,235	3	12	28
South Atlantic	173	171	206	1,396	345	451	6,366	8,391	4,157	15	36	95
East South Central	71	98	98	230	135	137	810	1,429	1,429	15	40	40
West South Central	137	165	204	705	864	704	2,637	1,424	1,424	12	13	26
Mountain	43	103	57	221	122	122	1,991	2,838	2,838	7	4	8
Pacific	105	140	132	200	436	309	11,942	3,383	4,395	5	23	19
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	217	87	164	10,046	12,685	17,305	1,057	1,366	812	875	1,023	981
New England	2	2	5	767	1,772	1,377	0	0	0	28	17	24
Middle Atlantic	10	9	13	2,816	3,802	4,989	46	0	0	71	87	78
East North Central	9	12	13	3,904	3,799	6,567	230	239	111	102	87	91
West North Central	4	8	7	808	1,165	1,925	331	505	412	40	29	66
South Atlantic	119	12	12	386	518	566	22	11	4	204	276	262
East South Central	6	21	8	219	162	192	147	46	5	87	165	140
West South Central	10	20	20	171	315	267	114	198	62	167	243	207
Mountain	19	2	3	321	352	387	39	126	109	29	62	43
Pacific	38	6	24	654	800	952	128	241	103	147	57	55

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Smallpox.—Tennessee, with an average of only 1 case per year during this period in the past 6 years, reported 139 cases of smallpox for the 4 weeks ended June 17. New York reported 45 cases, which breaks the past 6-year record of no cases reported for this period in that State. Georgia, with 18 cases, placed the incidence in the South Atlantic region on the highest level in that region since 1931. The high incidence of smallpox, which has been mostly confined to the Western and North Central regions, appears now to be spreading into

other regions. For the country as a whole the current incidence (1,057 cases) was only about 75 percent of the 1938 figure for this period, but it was about 30 percent in excess of the 1934–38 average incidence; with the exception of last year the current incidence is the highest for this period since 1931.

Influenza.—Although the number of cases of influenza declined about 70 percent during the current period, the total number of cases reported (3,236) was about 50 percent above the average seasonal incidence. The South Atlantic region appeared to be largely responsible for the excess incidence; in that region the number of cases was more than three times the preceding 5-year average number of cases for this period. In other regions the incidence compared very favorably with the experience of preceding years, the North Atlantic, North Central, and Pacific regions reporting a lower incidence, the West South Central approximately the same number of cases, and the East South Central and Mountain only slight increases over the 1934–38 median figure for the corresponding period.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended June 17 there were 1,022 cases of diphtheria reported, as compared with 1,260, 1,367, and 1,487 for the corresponding period in 1938, 1937, and 1936, respectively. The current incidence is the lowest recorded for this period in the 11 years for which these data are available. The country in general shared in this favorable situation, each geographic section reporting a very definite decline in the number of cases from the 1934–38 average incidence for this period.

Measles.—The number of cases (48,249) of measles reported for the current period was about 60 percent of the number reported for this period in 1938, which figure (79,893) also represents the preceding 5-year average incidence. The disease was unusually prevalent in the New England, South Atlantic, West South Central, and Pacific regions, while the Middle Atlantic, North Central, East South Central, and Mountain regions reported a relatively low incidence. Since the beginning of the current year the incidence in the Pacific region has been the highest on record; for the current period the number of cases (approximately 12,000) was about two and one-half times the normal seasonal incidence.

Scarlet fever.—The incidence of scarlet fever (10,046 cases) was the lowest in recent years. The East South Central region reported a 30-percent increase over last year's figure for this period, as well as a slight increase over the 1934–38 average incidence, and in the Mountain region the incidence was only slightly below the seasonal expectancy, but all other regions reported very definite decreases from the average incidence for this period.

Meningococcus meningitis.—The meningococcus meningitis incidence continued at a relatively low level in all sections of the country. The number of cases (140) reported for the 4 weeks ended June 17 was about 60 percent of the number reported for this period in 1938, and about 40 percent of the average figure (363 cases) for the period. For the years 1932–34, the only 3 years within the past 11 years in which the incidence has been exceptionally low, the average number of cases for this period was approximately 200 cases, which shows the very low incidence of this disease that has prevailed since the beginning of the current year.

Typhoid fever.—For the 4 weeks ended June 17, the State of Washington reported 113 cases of typhoid fever, as compared with 9, 3, and 8 cases for the corresponding period in 1938, 1937, and 1936, respectively. Ohio, with 40 cases as against 26 last year, and Illinois, with 33 cases as against 19, raised the incidence in the East North Central region slightly above the normal seasonal expectancy. In other regions the incidence either stood at about the normal seasonal level or was definitely lower than in recent years. For the country as a whole the number of cases reported (875) was about 10 percent below the preceding 5-year average number of cases for this period.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended June 17, based on data received from the Bureau of the Census, was 10.6 per 1,000 inhabitants (annual basis). The current rate is the lowest for this period since 1933; the average rate for this period in the years 1934–38 was 11.1.

PROVISIONAL MORTALITY RATES FOR THE FIRST QUARTER OF 1939

The mortality rates in this report are based upon preliminary data for 38 States, the District of Columbia, Alaska, and Hawaii for the first 3 months of 1939. Comparative data for 29 States and the District of Columbia are presented for the corresponding period of 1938.

This report is made possible through a cooperative arrangement with the respective States, which voluntarily furnish provisional quarterly and annual tabulations of current birth and death records. The reports are compiled and published by the United States Public Health Service.

Because of lack of uniformity in the method of classifying deaths according to cause, and because a certain number of certificates were not filed in time to be included, these data are preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past, these preliminary reports have provided an early and accurate index of the trend in mortality for the country as a whole. Some deviation from the final figures for individual States is to be expected, because of the provisional nature of the information. It is believed, however, that the trend of mortality within each State is correctly represented. Comparisons of specific causes of death among different States are subject to error because of differences in tabulation procedure and completeness of reporting. Comparisons of this nature should be made only from the final figures published by the Bureau of the Census.

Reports for the first quarter of 1939 reveal that the unusually favorable record of 1938 has not been maintained. Mortality from all causes, 12.2 per 1,000 estimated population, during this quarter was 7 percent greater than that for the corresponding period of 1938, but, nevertheless, it was still about 5 percent less than the rate for 1937. The increase was fairly widespread; 23 of the 30 States for which comparative data are available reported an increased death rate, while only 2 reported a lower rate. The rise in the mortality rate was not due to an unusually high rate from any specific disease, although a minor outbreak of influenza late in the winter resulted in some increase in mortality, but rather to generally increased mortality from a large number of diseases.

Increased death rates were reported for nearly all of the important diseases, cancer, diabetes, cerebral hemorrhage, heart diseases, influenza, and pneumonia, diseases of the digestive system, nephritis, and for accidents. For all except the first four, however, the rates were less than those reported in 1937. The death rate from automobile accidents, as well as that from all accidents, showed only a very slight increase over 1938. The increase in the total death rate was also reflected in the infant mortality rate, which was about 6 percent higher than during the first quarter of 1938; however, it was still 16 percent below the rate for 1937.

The principal communicable diseases of early childhood, measles, scarlet fever, whooping cough, and diphtheria, took fewer lives than during the first quarter of 1938, and, except for measles, caused fewer deaths than in 1937. Also encouraging was the continued decline in the mortality rate from tuberculosis, although the decrease, 2 percent, was not as great as that for the previous year, 12 percent. The death rate from complications of pregnancy and childbirth showed a decrease of 9 percent over 1938, thus indicating that the declining mortality rate from these causes is continuing in 1939.

The birth rate for these States showed no change from 1938, but since the death rate was higher, the crude rate of natural increase, 4.1 per 1,000 population, was 15 percent less than that for the previous year.

Provisional mortality from certain causes in the first 3 months of 1939, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																			
			Total infant mortality	Maternal mortality	Typhoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis (130–132)	All accidents (176–195, 201–214)	Automobile accidents (206, 208, 210)
30 States: [1]																								
1939	12.2	16.3	54	4.0	0.6	1.3	1.2	2.4	1.7	32.1	0.2	0.5	0.7	50.1	123.4	29.9	97.9	332.4	107.6	58.1	4.0	80.1	66.4	22.1
1938	11.5	16.3	51	4.4	.6	4.0	1.7	3.2	2.1	20.0	.3	.6	1.2	51.0	117.3	26.0	90.3	296.1	103.9	57.8	4.4	79.0	66.0	22.0
1937	12.9	15.1	64	5.5	.8	.8	2.3	3.1	2.0	69.0	.3	.7	2.6	57.9	112.3	27.9	94.8	309.5	151.0	60.8	4.4	82.2	74.3	27.1
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over: [2]																								
1939	8.8	----	----	----	.4	1.0	1.2	2.3	1.6	18.7	----	----	----	47.4	101.9	30.1	86.0	[3] 183.0	78.4	----	[4] 4.9	[5] 58.3	44.2	16.6
1938	8.5	----	----	----	.8	2.9	1.9	1.7	2.2	13.4	----	----	----	47.7	94.9	26.9	64.1	[3] 169.4	78.6	----	[4] 5.6	[5] 58.2	46.7	18.0
1937	9.8	----	----	----	.5	1.0	2.5	3.2	2.2	46.8	----	----	----	56.9	95.9	30.2	66.8	[3] 185.4	122.0	----	[4] 5.2	[5] 66.2	51.4	20.4
Alabama:																								
1939	10.8	20.9	68	5.8	1.4	2.9	.7	3.9	2.6	65.1	.6	.4	1.2	52.8	58.7	13.8	76.6	175.4	121.2	45.1	5.0	78.7	64.8	19.4
1938	11.5	21.9	66	6.7	.7	7.1	1.1	4.4	3.8	55.6	.3	.6	4.0	56.2	57.2	15.4	75.7	176.4	129.9	51.1	5.4	83.6	68.3	20.0
1937	12.2	21.4	78	5.6	1.1	(6)	(6)	5.3	2.7	114.7	.4	.3	5.3	65.0	59.3	12.7	74.1	165.4	146.8	50.0	6.6	85.3	73.3	20.3
Alaska:																								
1939	13.9	25.6	44	2.4	(6)	(6)	(6)	6.2	6.2	(6)	(6)	6.2	(6)	324.4	68.6	6.2	49.9	205.9	180.9	25.0	(6)	12.5	137.3	(6)
1938	30.9	40.4	74	(6)	(6)	6.4	6.4	173.8	(6)	77.2	(6)	(6)	(6)	740.3	109.4	(6)	225.3	302.6	366.9	64.4	(6)	19.3	315.4	(6)
1937	17.5	24.0	165	11.3	(6)	(6)	(6)	60.8	(6)	74.4	(6)	(6)	(6)	331.2	81.1	6.8	74.4	338.0	169.0	40.6	(6)	20.3	141.9	(6)
California:																								
1939	13.3	15.5	45	3.0	.6	1.6	.6	.7	1.1	6.1	.2	.1	.9	66.9	154.7	29.1	99.6	416.8	78.3	78.1	4.6	86.3	90.1	39.4
1938	13.1	15.6	47	3.0	1.2	1.4	.6	2.3	1.9	7.6	.2	.4	1.2	71.7	144.0	26.3	96.6	389.0	89.8	75.4	7.4	88.7	89.9	38.4
1937	16.3	14.3	58	4.8	.7	.6	1.2	4.4	1.9	69.3	.1	.6	3.6	91.3	144.0	32.6	101.6	478.3	160.4	83.8	5.3	96.1	111.0	49.8
Colorado:																								
1939	13.0	18.9	69	5.2	1.1	1.5	1.9	6.4	4.1	50.7	(6)	.4	1.1	54.5	113.1	19.5	105.6	275.5	154.9	63.9	6.4	92.8	71.8	20.7
1938	12.4	18.6	59	5.3	1.1	4.9	1.5	1.9	5.3	23.4	1.1	.4	1.1	64.1	117.0	17.4	98.5	249.0	144.1	75.4	6.0	87.9	75.4	22.6
1937	16.4	17.9	79	7.2	.8	(6)	3.0	8.3	3.8	153.7	1.5	.8	2.6	75.0	121.6	18.9	95.8	253.7	351.4	81.0	6.8	86.0	70.0	21.6

Connecticut:																								
1939	11.3	13.2	37	2.8	(6)	.7	.5	1.9	1.2	10.4	(6)	(6)	(6)	38.7	145.5	29.9	96.9	280.1	86.0	49.4	2.3	86.0	55.7	15.5
1938	11.2	13.3	35	2.8	(6)	(6)	.7	.5	1.4	7.7	(6)	.2	.5	37.6	141.3	32.5	93.0	276.3	89.5	52.8	4.0	91.8	62.0	17.4
1937	11.9	12.0	50	3.8	.5	1.6	1.4	2.8	.9	35.7	(6)	.5	1.2	37.5	134.8	39.4	97.0	265.9	127.2	54.9	2.8	92.9	64.4	21.3
Delaware:																								
1939	13.7	17.6	49	4.4	(6)	(6)	(6)	4.6	3.1	24.7	(6)	1.5	(6)	70.9	117.2	40.1	120.3	417.9	145.0	54.0	6.2	128.0	67.8	29.3
1938	13.2	15.9	61	3.9	1.5	3.1	(6)	10.8	1.5	27.9	(6)	(6)	1.5	38.7	103.8	34.1	142.4	400.9	114.5	34.1	(6)	108.4	68.1	21.7
1937	16.0	16.3	80	3.8	3.1	4.7	(6)	6.2	1.5	66.8	(6)	(6)	3.1	48.2	97.9	35.7	116.5	453.7	166.3	54.4	10.9	132.1	82.4	34.2
District of Columbia:																								
1939	14.3	21.1	49	5.4	.6	(6)	(6)	1.9	.6	21.4	(6)	.6	1.3	70.6	160.8	32.2	93.3	403.7	110.4	79.5	7.6	111.0	75.7	18.3
1938	13.7	20.3	52	4.4	(6)	.6	1.9	.6	1.9	8.9	(6)	1.3	2.6	69.6	131.6	24.9	93.9	355.1	152.0	70.2	5.1	118.2	67.1	21.1
1937	17.2	19.5	76	6.0	.6	2.6	1.3	5.8	5.2	52.4	(6)	.6	7.8	102.2	146.8	37.5	116.4	381.6	249.7	75.0	5.2	106.7	88.6	33.0
Florida: [7]																								
1939	13.6	17.1	65	5.9	.7	.7	.4	2.9	1.4	38.8	(6)	.4	1.1	56.1	97.5	26.3	116.2	307.9	83.1	83.4	11.1	102.1	116.5	47.5
1938	14.3	16.9	52	7.8	1.8	.7	.4	2.2	1.8	41.6	(6)	.7	1.1	58.4	107.3	27.7	117.9	326.6	111.0	78.8	5.5	110.2	95.3	42.7
1937	13.3	16.9	59	7.7	2.2	.4	(6)	2.2	3.0	65.2	(6)	.4	5.6	61.1	87.8	24.8	107.4	261.9	88.5	94.5	15.2	100.8	121.1	54.8
Georgia:																								
1939	9.3	17.5	68	7.1	.9	3.4	.4	3.1	1.3	41.9	.3	.1	.6	42.6	50.9	12.2	80.6	159.4	98.9	40.6	4.0	85.9	47.0	18.4
1938	10.4	18.1	68	7.3	.5	6.9	.6	4.4	1.7	47.4	.4	.5	.9	51.6	54.8	13.4	83.2	166.8	124.2	50.0	5.1	104.6	58.9	22.8
1937	10.7	17.7	69	7.5	1.7	.3	.4	2.4	2.6	94.8	.5	.4	1.8	47.6	50.0	11.6	83.7	157.6	120.2	47.3	4.6	94.9	63.5	25.1
Hawaii:																								
1939	6.9	16.6	62	5.2	3.5	(6)	(6)	2.6	2.6	4.3	(6)	(6)	(6)	56.4	52.1	18.2	37.3	129.4	57.3	55.6	10.4	57.3	43.4	11.3
1938	7.2	19.9	56	3.1	1.8	(6)	.9	8.0	.9	5.3	1.8	(6)	.9	59.3	63.8	11.5	50.5	116.9	71.7	61.1	17.7	68.2	39.0	9.7
1937	9.5	20.4	82	5.3	3.6	102.3	(6)	.9	1.8	9.1	(6)	(6)	.9	79.7	62.5	19.0	47.1	121.9	109.5	75.1	19.0	65.2	53.4	16.3
Idaho:																								
1939	10.4	21.1	58	2.3	4.0	.8	.8	2.4	.8	39.4	(6)	.8	4.0	19.3	94.8	26.5	88.3	277.9	106.0	54.6	2.4	36.1	75.5	25.7
1938	9.4	20.9	45	5.0	2.4	1.6	.8	3.2	(6)	21.9	(6)	1.6	1.6	21.9	67.3	5.7	68.1	181.7	118.4	60.0	1.6	39.7	62.4	24.3
1937	12.0	20.3	57	3.6	.8	6.6	2.5	1.6	(6)	118.4	(6)	.8	2.5	28.0	93.0	11.5	78.1	188.4	128.3	67.4	5.8	37.0	65.8	20.6
Illinois:																								
1939	12.6	13.9	45	3.5	.3	.1	1.8	2.9	2.1	35.6	.2	.3	.2	48.9	140.6	33.3	83.0	400.6	103.7	58.4	1.8	112.5	59.3	22.2
1938	11.5	14.3	44	3.6	.3	7.1	3.2	.6	1.6	10.5	.2	.4	.4	46.1	132.6	31.0	78.6	341.5	92.8	61.6	3.0	100.0	62.3	22.6
1937	12.7	13.2	57	5.1	.2	.1	3.7	2.6	2.5	51.5	.4	.5	2.5	52.4	127.1	31.8	80.4	355.3	123.8	71.5	2.8	110.3	87.1	29.2
Indiana:																								
1939	12.8	15.7	49	4.2	.3	.2	2.4	1.0	1.9	69.2	(6)	.7	.6	44.2	112.5	20.8	146.3	275.9	138.7	(8)	2.8	67.8	61.8	23.4
1938	11.6	15.8	44	4.6	.2	6.3	3.0	2.0	3.1	22.8	.5	.9	1.2	42.7	114.0	17.3	129.8	256.6	103.8	(8)	3.0	64.7	65.1	26.3
1937	13.2	14.5	64	3.4	1	.9	5.6	5.0	1.6	90.6	.5	.5	2.8	54.9	103.4	18.8	127.5	288.7	181.9	(8)	3.9	70.0	73.3	32.7
Iowa.																								
1939	11.8	(8)	(8)	(8)	.5	2.2	2.1	1.7	.5	64.4	(6)	.8	.8	19.3	119.9	34.7	121.6	319.6	97.8	58.7	2.2	62.7	62.5	14.8
1938	10.4	16.7	40	4.1	.5	1.1	4.1	3.8	1.0	23.4	.3	.6	.8	21.4	133.1	23.8	112.6	257.0	100.1	59.1	3.3	66.1	59.6	15.7
1937	11.4	14.7	54	6.7	(6)	.2	7.0	1.7	.3	96.5	.6	1.3	1.1	22.1	124.1	25.9	117.0	244.9	110.9	52.8	3.0	68.8	69.1	15.7
Kansas: [7]																								
1939	10.4	13.6	50	4.9	1.0	(6)	1.0	.7	1.6	27.4	(6)	2.0	.7	22.8	108.6	33.7	82.2	263.6	82.2	52.1	3.0	104.6	92.1	17.2
1938	10.3	14.3	50	3.7	.3	2.0	2.7	2.3	.7	21.9	(6)	.7	.7	26.6	106.2	25.6	86.6	242.6	97.9	58.7	2.0	106.5	90.3	22.9
1937	13.2	13.6	66	5.6	(6)	(6)	8.0	1.7	2.3	116.8	.3	1.0	2.0	31.9	110.9	23.9	127.1	285.4	148.4	59.4	2.3	97.2	108.2	19.9
Maine:																								
1939	14.0	16.8	67	4.2	2.4	.9	.5	4.7	6.6	32.5	(6)	(6)	.5	33.5	149.0	29.7	135.8	422.5	113.6	49.0	4.7	81.1	52.8	12.3
1938	12.9	17.9	50	4.5	1.9	3.8	(6)	3.8	1.4	23.6	.5	(6)	(6)	33.1	145.1	27.9	122.4	345.5	105.9	56.7	7.1	96.0	58.6	14.7
1937	14.4	16.7	69	6.5	1.4	.5	.5	1.9	.5	100.9	(6)	(6)	1.4	30.3	146.9	23.7	126.5	393.7	161.1	58.3	4.7	101.9	46.4	12.3

See footnotes at end of table.

Provisional mortality from certain causes in the first 3 months of 1939, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23-32)	Cancer, all forms (45-53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90-95)	Pneumonia, all forms (107-109)	Diseases of the digestive system (115-129)	Diarrhea and enteritis under 2 years (119)	Nephritis (130-132)	All accidents (176-195, 201-214)	Automobile accidents (206, 208, 210)
Maryland:																								
1939	14.4	17.6	55	2.7	0.5	2.6	0.5	1.4	2.4	23.0	(6)	0.7	1.2	80.9	138.1	32.6	122.6	396.9	136.5	52.2	4.3	153.2	73.3	18.7
1938	13.4	17.7	56	2.9	.2	.7	1.2	4.6	1.0	16.1	(6)	1.9	1.2	81 4	129.8	32.8	101.9	366.8	135.1	56.1	3.6	139.0	67.4	21.9
1937	15.4	16.6	72	4.4	.7	4.3	1.2	7.0	2.4	47.8	.5	2.2	5.1	84.8	127.8	30.2	128.3	366.9	194.4	57.2	6.0	163.5	84.5	31.9
Michigan:																								
1939	12.4	18.4	53	4.0	.3	1.3	2.5	1.8	1.0	40.6	(6)	.2	.4	40.6	123.4	33.2	101.6	352.6	111.5	62.1	4.4	67.2	67.6	20.9
1938	10.9	18.6	48	3.8	.9	3.1	3 6	1.5	1.1	11.7	(6)	.5	.5	39.1	116.6	28.5	96.0	306.9	80.6	59.1	5.3	59.9	62.2	21.1
1937	12.4	17.4	61	4.1	.2	(6)	5.5	3.7	1.2	50.2	(6)	.2	1.2	44.2	116.7	28.8	95.2	307.4	136.4	64.8	4.1	65.8	73.5	29.4
Minnesota:[7]																								
1939	10.5	18.0	46	2.6	.2	6.5	.7	.5	1.2	15.7	(6)	.5	.5	32.8	139.2	28.6	101.6	270.1	84.3	60.2	3.2	45.9	56.1	14.1
1938	10.0	17.4	41	3.9	.2	(6)	2.6	2.3	.2	15 3	.7	.2	.7	26.2	141.5	27.9	93.9	251.4	93.2	54.5	2.3	49.2	55.7	19.0
1937	12.4	16.5	58	4.5	.2	.5	2.6	1.4	.9	104.0	(6)	.9	1.9	35.0	139.3	27.5	102.9	292.5	154.0	56.0	.7	46.9	63.7	14.2
Missouri:																								
1939	12.0	17.0	52	3.4	1.1	.4	1.8	2.1	2.7	30.1	.5	.6	1.0	48.9	126.9	27.3	98.6	272.0	130.0	59.2	5.7	116.4	66.3	20.9
1938	12.3	15.9	57	4.5	2.0	9.6	4.2	7.2	4.6	30.0	.7	.4	.8	51.8	122.6	24.9	91.9	287.8	141.2	57.3	4.2	107.1	72.5	26.0
1937	14.1	12.3	83	8.0	3.7	(6)	3.7	3.2	3.0	90.7	.4	.9	2.0	61.9	121.4	26.5	101.8	291.5	210.8	60.1	5.1	114.2	86.0	31.1
Montana:																								
1939	11.7	18.3	66	4.8	2.2	8.8	1 5	8.1	.7	35.4	(6)	2.2	.7	39.1	112.8	16.2	94.4	258.1	118.7	65.6	5.2	62.7	88.5	19.2
1938	10.7	19.3	45	5.0	.7	1.5	2.2	5.2	1.5	33.5	(6)	(6)	1.5	46 1	84.8	24.6	93.8	224.7	116.8	55.8	3.7	76.5	77.4	19.3
1937	14.1	18.5	69	3.7	3.0	.8	6.8	1.5	3.8	181.3	(6)	1.5	3.0	45.1	101.6	21.1	113.6	218.2	205.4	60.9	.8	72.2	79.0	15.0
Nebraska:[7]																								
1939	9.7	16.0	36	2.8	1.4	1.4	.9	.5	.9	25.8	(6)	1.4	.5	15.4	107.8	27.2	95.6	159.4	99.2	56.2	1.8	68.8	62.5	13.6
1938	9.0	16.4	40	3.3	.9	(6)	.5	2.3	1.4	20 0	(6)	(6)	.9	12.7	117.0	25.4	78.5	233.6	84.8	45.8	2.7	58.5	50.3	15.9
1937	13.4	15.9	74	5.4	.5	(6)	5.9	3.6	1.4	190.0	.5	(6)	.9	23.6	116.6	37.6	99.8	272.6	161.0	58.5	3.2	75.7	64.4	18.6
Nevada:																								
1939	12.6	18.8	55	2.1	(6)	3.9	(6)	(6)	(6)	15.7	(6)	(6)	(6)	55.1	129.9	3.9	86.6	334.7	165.4	39.4	(6)	70.9	78.7	15.7
1938	12.2	17.0	56	4.7	4.0	(6)	(6)	(6)	4.0	4.0	(6)	(6)	(6)	87.5	99.4	15.9	71.6	302.2	163.0	31.7	(6)	79.5	107.4	31.8
1937	14.5	12.2	75	3.2	(6)	(6)	4.0	(6)	(6)	28.1	(6)	(6)	(6)	72.2	100.4	4.0	100.4	273.0	212.8	44.2	8.0	80.2	136.5	35.1

New Jersey:																								
1939	11.5	12.9	47	3.5	.2	(6)	1.3	2.1	.7	13.9	.2	.7	.6	44.7	132.0	38.1	91.7	389.0	87.7	55.9	3.3	78.2	48.0	16.5
1938	10.7	12.9	43	3.3	.1	1.2	.4	1.3	1.3	8.1	.1	.7	1.0	45.6	122.7	30.8	85.0	343.6	89.8	57.8	3.4	80.1	51.2	18.5
1937	11.7	12.2	51	4.4	.3	1.8	.4	1.7	.8	26.3	.1	.8	2.0	50.7	119.1	35.1	82.9	362.3	119.7	54.6	3.4	80.0	63.3	25.9
New Mexico:																								
1939	16.6	35.3	125	7.0	1.0	1.9	1.9	9.5	9.5	64.7	1.0	(6)	2.9	100.9	64.7	10.5	49.5	155.2	227.5	77.1	10.5	72.4	89.5	45.7
1938	13.6	32.6	94	4.7	3.8	23.1	(6)	26.9	4.8	32.7	1.0	(6)	1.0	94.2	59.6	3.8	55.7	156.6	148.0	72.1	14.4	58.6	57.5	34.6
New York:																								
1939	12.9	14.6	46	3.2	.2	.5	.8	1.1	.3	8.9	(6)	.3	.7	52.6	158.7	45.2	74.1	439.8	102.3	61.5	5.3	82.1	58.4	13.5
1938	12.3	14.4	45	4.0	.2	.2	.7	1.2	.5	6.9	.1	.7	1.1	52.3	156.8	38.7	72.4	399.8	99.1	61.7	5.2	81.3	61.4	17.3
1937	13.9	14.2	54	4.4	.3	.5	1.4	1.5	.9	29.1	(6)	.7	2.1	64.5	154.1	44.3	87.0	413.8	160.5	71.9	6.4	86.4	68.4	20.3
North Carolina:																								
1939	9.6	21.3	65	5.5	.6	2.8	.7	7.2	4.6	34.4	.1	.3	.5	53.4	58.3	5.6	87.4	166.9	102.6	46.7	6.1	86.9	58.5	21.7
1938	10.3	22.4	63	6.3	.7	10.0	.6	4.7	6.3	29.4	.2	.7	1.6	54.0	54.2	11.6	86.5	174.1	128.0	49.9	6.0	95.6	62.3	21.3
1937	10.4	22.2	70	5.8	1.0	.9	.6	2.6	4.9	58.0	.3	.9	1.2	61.8	52.4	11.4	84.5	168.3	131.0	44.6	5.3	88.3	69.1	26.1
North Dakota:																								
1939	8.2	19.4	59	3.8	.6	6.3	2.9	2.9	.6	30.3	(6)	1.1	1.1	22.3	87.4	29.1	71.4	189.6	78.3	45.7	8.0	45.7	29.1	7.4
1938	7.3	18.9	44	1.2	(6)	1.1	1.7	12.0	.6	10.3	(6)	(6)	1.2	20.6	84.2	22.9	59.0	146.6	66.4	49.8	5.2	46.4	42.4	10.9
1937	9.6	19.5	69	6.2	(6)	(6)	1.7	(6)	1.7	68.9	(6)	.6	4.0	30.4	90.8	24.7	87.3	181.5	113.7	53.4	12.1	41.4	53.4	9.8
Ohio:																								
1939	13.1	14.4	55	4.0	.3	.2	2.0	1.3	1.5	40.1	.1	.9	.4	46.7	134.2	33.6	127.6	351.9	112.7	61.8	3.4	90.2	76.7	23.8
1938	12.0	16.1	49	3.5	.4	5.1	2.1	2.0	1.6	20.2	.2	.4	1.1	48.8	127.6	28.2	112.0	300.7	96.0	57.3	3.5	83.1	79.8	23.3
1937	13.8	14.8	61	6.0	.6	.7	3.1	4.0	1.9	78.6	.2	1.1	2.2	55.6	112.2	32.4	124.0	325.3	148.0	62.5	4.3	88.5	94.7	37.8
Oklahoma:																								
1939	9.5	17.0	63	4.1	2.2	6.0	1.6	1.9	3.3	43.7	.5	.6	.2	42.1	69.7	15.7	82.9	165.2	118.3	42.9	4.1	61.3	100.8	21.8
1938	9.0	18.5	49	4.7	2.2	1.1	1.4	9.8	7.0	34.6	1.7	.2	1.7	54.1	75.4	14.4	75.4	126.8	96.1	50.8	6.0	66.6	64.4	17.4
1937	10.6	16.1	72	7.2	1.9	1.0	2.1	1.6	3.3	121.6	1.0	.3	4.5	55.7	70.8	15.1	73.5	153.3	150.1	53.0	2.2	71.1	61.9	22.6
Oregon:																								
1939	12.2	15.1	46	2.1	.4	(6)	.4	.8	(6)	14.8	.4	.8	.8	28.8	135.7	31.1	131.0	307.6	76.6	35.0	.4	136.5	77.0	26.1
1938	12.2	15.7	38	3.8	(6)	(6)	1.6	1.6	1.2	16.5	.8	2.7	1.2	28.2	131.3	25.1	107.4	299.0	81.9	45.5	1.2	120.3	70.9	17.6
1937	14.5	14.8	49	4.3	.8	.4	2.4	3.2	.4	98.7	(6)	.8	.8	39.5	126.8	28.4	114.9	351.5	122.4	63.6	.4	126.8	74.6	24.1
Pennsylvania:[7]																								
1939	11.9	15.7	53	3.5	.8	.2	.9	2.0	1.2	18.0	.1	.6	.9	41.1	121.9	39.4	93.4	364.9	82.9	53.0	4.9	94.5	49.8	12.8
1938	12.0	16.3	53	3.6	.5	4.9	2.0	1.6	1.8	20.4	(6)	.8	.9	42.1	118.1	37.4	89.6	347.4	98.0	55.5	4.5	85.3	60.6	16.8
1937	13.7	15.5	65	5.3	.4	.4	2.7	3.8	1.8	92.5	.1	.9	2.2	54.2	114.1	37.9	87.9	360.1	148.9	55.7	4.0	98.3	61.9	19.4
South Carolina:[7]																								
1939	8.8	16.1	79	7.7	2.6	.3	.7	7.2	1.6	41.8	.7	.3	1.0	37.2	39.5	12.7	94.3	167.4	98.3	13.7	1.3	77.0	55.5	22.5
1938	9.8	16.4	86	7.4	1.6	7.2	1.6	8.5	1.3	68.6	.3	.3	1.0	36.8	43.3	11.5	82.4	173.0	121.4	12.1	.3	85.0	50.2	21.3
1937	8.9	14.6	107	9.9	1.6	1.0	(6)	1.0	4.9	65.4	(6)	.6	1.6	37.8	40.4	9.2	80.2	150.6	110.8	11.8	3.9	69.1	42.4	21.4
Tennessee:																								
1939	9.5	14.2	64	5.7	.7	2.1	.4	3.6	2.2	56.7	.6	.1	1.1	71.8	63.2	11.6	76.4	169.4	107.9	52.0	3.3	56.0	51.6	16.0
1938	9.5	14.7	63	6.9	.7	10.7	.6	6.2	3.5	46.9	.7	.6	2.5	74.4	64.0	10.8	79.7	152.6	121.0	47.2	2.6	59.7	57.4	19.4
1937	11.2	14.2	78	9.2	1.1	1.1	1.0	3.8	4.9	117.2	.3	.7	4.0	85.5	61.7	12.9	81.6	164.9	164.7	47.8	2.6	60.6	63.5	22.6
Texas: 1939	9.6	16.4	71	5.6	1.6	1.4	.6	3.1	3.4	51.4	.4	.1	.5	58.4	68.0	12.9	67.8	181.6	115.7	(6)	9.1	62.8	57.5	20.9
Utah:																								
1939	9.2	24.4	49	3.2	(6)	(6)	(6)	(6)	(6)	14.0	(6)	.8	2.3	21.8	94.2	14.8	42.8	269.3	72.4	66.2	.8	69.3	57.6	20.2
1938	9.5	24.3	52	3.2	(6)	3.1	3.1	4.7	(6)	21.0	(6)	(6)	4.7	21.0	84.2	22.6	50.7	245.7	88.9	60.0	3.9	56.9	81.9	34.3
1937	10.9	21.7	45	5.0	(6)	.8	3.1	3.9	.8	67.2	.8	1.6	3.1	21.9	93.0	22.7	67.5	275.8	96.1	73.4	3.1	57.0	74.2	27.4

See footnotes at end of table.

Provisional mortality from certain causes in the first 3 months of 1939, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis (130–132)	All accidents (176–195, 201–214)	Automobile accidents 206, 208, 210)
Vermont:																								
1939	12.4	14.5	37	5.0	(6)	(6)	1.0	5 2	1.0	38.6	(6)	1.0	1 0	37.5	139.7	34.4	139 7	367.0	146.0	44.8	5.2	77.1	64.6	20.9
1938	12.3	14.8	55	3 5	(6)	10.5	(6)	4 2	(6)	24.2	(6)	(6)	(6)	45.2	121.9	30.5	120.0	339 4	134.5	65.1	2.1	87.2	49.4	12.6
1937	13.5	11.8	58	15.2	2.1	(6)	(6)	2.1	2.1	93.2	(6)	(6)	1.0	54.0	136.6	19.1	119.6	349.4	151.4	60.4	5.3	74.1	70.9	16.9
Virginia:																								
1939	11.5	17.0	77	6.6	.3	.4	.4	6.0	3.7	47.2	.1	.4	1.6	61 9	73.6	20.2	112.2	252.9	111.4	40.0	2.1	89.4	64.7	21.1
1938	11.2	17 5	73	5.6	1.2	6 2	.3	7.7	3.3	36.5	(6)	.1	2.2	68.9	71.7	18.7	94.1	245.2	112.6	40.9	3.6	85.7	59.1	21.2
1937	12.7	17.5	81	5.5	.9	2.8	.6	6 6	3.1	107.0	.6	.9	7.2	67.1	69.5	18.1	99.7	244.6	191.2	39.3	2.4	96.5	59.0	21.9
Washington:																								
1939	11.8	13.7	51	3.5	.7	.7	.5	.2	.7	15.2	1.0	.7	1.0	40 7	140 3	28.5	112.8	313.4	83.9	61.0	2.2	72.8	80 5	21 9
1938	11.6	14.1	43	4.0	.5	.5	.5	3.2	.7	22.1	.2	2.2	1.2	44 7	137.4	27 4	114.6	293 8	92.5	56.6	.5	75.3	69.9	24.0
1937	13.1	12.6	56	5.2	1.0	2.0	2.2	.2	1.2	75.1	.2	2.0	1.5	45 0	126.2	28.9	114.6	321.4	121.3	57.0	1.0	88.5	80.0	23.0
Wisconsin:[7]																								
1939	11.4	15.1	59	3 7	(6)	1.3	1.7	1.7	.6	22.2	.2	.4	.4	27.4	136.9	34.5	101.1	351.0	81.2	(8)	4.8	63.6	60.1	16.3
1938	10 6	16.1	49	2.4	(6)	.6	1.5	1 9	.8	11 6	.4	.2	.2	27 6	128.5	30.3	101.0	299 3	90.0	(8)	2.9	69.8	56.0	13.5
1937	13.2	15.4	65	4.0	.2	(6)	5.1	.6	1.3	99.8	(6)	.4	1.1	39.1	133.8	36.6	110.2	339.6	129.6	(8)	3.8	80.1	67.7	18.8
Wyoming:																								
1939	9.8	19.1	59	3.6	1.7	1.7	(6)	1.7	3.4	25 5	(6)	(6)	(6)	20 4	88 2	15.3	76.4	249.4	84.8	49.2	1.7	83.1	83 1	18.7
1938	9 3	16 9	60	7.1	(6)	(6)	(6)	29.1	1.7	27 4	(6)	(6)	1.7	18 8	97 5	15.4	61.6	215.6	104.4	71.9	8.6	47.9	85.6	34.2
1937	12.6	17.9	71	8.7	1.7	1.7	12.1	3.5	(6)	158.8	1.7	1.7	5.2	15.6	57.0	6.9	65.6	253.7	201.9	70.8	13.8	43.3	89.7	20.7

[1] Includes all States with data for the 3-month period of 1937, 1938, and 1939 The District of Columbia is included as a State. Estimated population July 1, 1939: 83,599,000.

[2] These data are taken from the April 1938 and 1939 Statistical Bulletins published by the Metropolitan Life Insurance Co All figures are provisional and are subject to correction, since they are based on provisional estimates of lives exposed to risk (17,700,000 persons in 1938). Data do not include all diseases reported to the Public Health Service.

[3] Excludes pericarditis, acute endocarditis, acute myocarditis, coronary artery diseases, and angina pectoris.

[4] Classified as diarrhea and enteritis, age not specified.

[5] Chronic nephritis (Bright's disease) only.

[6] No deaths reported.

[7] January and February.

[8] Data not available.

[9] Less than 0.1 per 100,000 population.

THE INDUCTION OF CARDITIS BY THE COMBINED EFFECTS OF HYPERTHYROIDISM AND INFECTION [1]

By MARK P. SCHULTZ,[2] *Surgeon, United States Public Health Service*

Some observers conclude that patients with exophthalmic goiter and animals given toxic doses of thyroid hormone suffer extensive morphological cardiac damage. Others, on the basis of similar investigations, find that hyperthyroidism induces at the most very slight injury of this kind. In some accounts belonging to the former category, it is recorded that different types of infection were present during the period of hyperthyroidism.

The effect of chronic infection upon the cardiovascular system in thyroid-treated animals was, therefore, considered worthy of investigation. It was the purpose of the experiments reported here to study the morphological changes in the heart and aorta incident to chronic, focal, hemolytic streptococcus infection in rabbits receiving thyroxin and in guinea pigs fed desiccated thyroid. In order to investigate the pathogenesis of cardiovascular lesions induced in this manner, certain attributes of infection in thyroid-treated animals as indicated by the body temperature, variations in the erythrocyte sedimentation rate, and peculiarities of antibody responses were compared with those of infected, untreated animals. Inasmuch as a state of bacterial hypersensitivity may be followed by one of immunity in the type of focal infection employed, the influence of these two phases of infection was studied individually by rendering thyroid-toxic rabbits both hypersensitive and immune to bacteria. Further, an attempt was made to analyze the influence of increased metabolic rates upon the pathology of the heart and aorta during infection by investigating the effect of treatment with dinitrophenol under similar conditions.

REVIEW OF LITERATURE

The subject of cardiac pathology in exophthalmic goiter has been extensively reviewed by the following authors: Rautmann, 1915 (*1*); Wilson, 1923 (*2*); McEachern and Rake, 1931 (*3*); Baust, 1931 (*4*); Lewis, 1932 (*5*); Weller et al., 1932 (*6*); and de Chatel and Molnar, 1933 (*7*). Most investigators studying controlled series of *uncomplicated* cases have concluded that hyperthyroidism induces only slight permanent cardiac damage. These observers, however, occasionally encountered instances of extensive heart involvement for which no cause could be assigned.

On the other hand, there are numerous pathological descriptions, frequently of single cases, of severe carditis in association with exophthalmic goiter in which mention of concurrent infection is fre-

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quently omitted. The occurrence, however, of chronic bronchitis was noted in 1 of 2 such cases reported by Goodpasture (*8*) and of paratyphoid in 1 of the 2 described by Fahr (*9*); while pneumonia, erysipelas, or acute tonsillitis were present in single instances recorded by Ceelen (*10*), Loos (*11*), and Davis (*12*). Active infection was mentioned as a complication in 3 of 28 cases of hyperthyroidism in which extensive cardiac damage was described by Fahr and Kuhle (*13*). Others have reported similar findings without stating whether infection was present or not (*14, 15, 16, 17*). These observations suggest that, although morphological cardiac damage may not be detected in uncomplicated exophthalmic goiter, it may be induced by the coincident presence of infection.

More definitely suggestive evidence is afforded by studies of hyperthyroidism in different species of laboratory animals incident to the exhibition of thyroid-gland preparations, thyroxin, or inorganic iodine compounds. Some observers find the heart essentially negative to pathological examination in such experiments (*18, 19, 20, 21, 22*), while others describe extensive lesions without recording the presence or absence of associated infection (*15, 23, 24*). Heinlein and Dieckhoff (*25*), however, reported the occurrence of extensive morphological damage, without mentioning the frequency with which it developed, in a group of cats free from infection which had been given thyroxin for a long period of time.

Nevertheless, in certain reports, the occurrence of extensive cardiac lesions in experimental hyperthyroidism apparently can be correlated with a complicating factor of infection. Zalka (*26*) administered thyroxin to guinea pigs, cats, and rabbits. In the two species first named no evidences of infection were seen, and the hearts were found to be normal with the exception of 1 of 5 cats which developed definite myocarditis. On the other hand, 4 of the 7 rabbits examined had pneumonia, and extensive heart lesions developed in this species. Menne et al. (*27*) fed desiccated thyroid to a group of rabbits of which some members were found to harbor spontaneous infections. They discovered definite cardiac lesions in 90 percent of their animals but noted that "the latter were most pronounced in the hearts of rabbits with abscesses in the pleural cavities." Hashimoto (*28*) treated rats similarly and found extensive myocardial damage in many animals. Pneumonia, however, was present in 85 percent of them. Rake and McEachern (*29*), in attempting to eliminate the factor of infection, selected animals only after preliminary periods of observation during which the rate of weight gain and fluctuations of body temperature were noted. The 44 rabbits and 17 guinea pigs to which they administered thyroxin were, therefore, presumably healthy. Cardiac lesions developed in only 5 of the guinea pigs, which were found to be suffer-

ing from bronchisepticus pneumonia; there were no signs of infection in other animals.

In these last four investigations the influence of infection in inducing myocardial damage in animals with thyroidism was differently assessed. Zalka concluded that the occurrence of pneumonia in thyroxin-treated rabbits developing myocarditis was merely fortuitous because cardiac lesions also appeared in 3 rabbits and 1 cat without any demonstrable evidence of an associated infection. Hashimoto, probably on insufficient grounds, likewise considered that pneumonia was not a determining factor. He observed that pneumonia might be acute and extensive in rats dying early in the course of thyroid feeding and only slight myocardial damage be present. In animals observed longer, on the other hand, no acute pneumonia was found, but extensive cardiac lesions developed. He states,

> It is evident, therefore, that an acute pneumonia appearing in the thyroid-fed animals has little or no part in causing the myocarditic lesions * * *. The same is true of chronic pneumonia inasmuch as no myocarditic lesion was found in the control animals, although 85 percent of them showed chronic bronchopneumonia.

These conclusions appear unjustified for two reasons: (1) Since acute pneumonia was present in animals dying early (the average survival period was only 11 days), sufficient time may not have elapsed for the development of cardiac lesions; (2) the fact that chronic pneumonia did not incite cardiac lesions in controls has little bearing upon the question of its effect in animals with hyperthyroidism. Menne et al. stated that in some thyroid-fed rabbits which they observed, "* * * infection seems to have augmented the destruction of cardiac muscle," but that "there was no way of determining the relationship of these two conditions" (hyperthyroidism and infection). Rake and McEachern considered the possibility that hyperthyroidism might increase susceptibility of the heart to damage in the presence of infection but quoted statements which would indicate that uncomplicated bronchisepticus infection of the type they encountered is capable of inducing myocardial damage such as that observed.

Obviously, therefore, even though studies of cardiac pathology in exophthalmic goiter have not demonstrated that morphological lesions are incident to an associated infection, they are not incompatible with such a conception. Similarly, although such an effect of infection in experimental hyperthyroidism has not been proved, the results of several investigators suggest that it may be susceptible of demonstration. Such a relationship has been pointed out with respect to liver damage in experimental hyperthyroidism by Haban (*30*), who found extensive lesions only when there was an associated infection.

METHODS

Animals.—The rabbits were hybrids of English, lilac, and Havana varieties. All were males within 2 weeks of the same age, weighing between 1,200 and 1,500 grams at the start of each experiment. The guinea pigs were males of mixed stock obtained from a dealer and weighed approximately 400 grams.

Infection.—The rabbits were infected with a group C hemolytic streptococcus strain (K158b) originally isolated from a spontaneously infected rabbit. Cultures, grown 18 hours at 37° C. in "streptolysin broth" (*31*), were injected subcutaneously in axillary or inguinal regions at weekly intervals. The inoculations were arranged so that the same region was reinfected at approximately monthly intervals. The dose was gradually raised from 0.1 cc. to as high as 10.0 cc. in animals surviving for long periods. When quantities larger than 0.5 cc. were given, the culture was centrifuged and resuspended in sterile physiological saline. This treatment resulted in each infected rabbit having constantly one or more abscesses in groin or axilla of approximately 2 to 5 cm. in diameter. These animals were bled fortnightly for serum or determination of the erythrocyte sedimentation rate. Their rectal temperatures were taken daily, and they were weighed three times a week.

Guinea pigs were infected with a group C hemolytic streptococcus (J20) originally isolated from a guinea pig with spontaneous lymphadenitis. Cultures were grown in the manner described above for strain K158b, while chronic infection, maintained in a manner similar to that described for rabbits, was manifest by similar abscesses. The dose of culture for guinea pigs, however, was uniformly 0.1 cc., and local lesions occasionally broke down with the discharge of yellow pus. Among the guinea pigs, spontaneous hemolytic streptococcus lymphadenitis was frequently present. Infections of this type were present in one group selected for study. Other guinea pigs were examined with care clinically and pathologically to exclude the presence of this complication.

Bacterial hypersensitization.—A strain of indifferent streptococcus (Q155) was employed. Each rabbit to be sensitized received 0.01 cc. of broth culture intracutaneously daily for 22 days and thereafter an equivalent dose twice weekly until the experiment was terminated on the sixtieth day. Cultures were diluted with physiological saline so that 0.1 cc. volume was injected. About the first, fourteenth, twenty-first, and sixtieth days, using small calipers, two diameters and the height of cutaneous lesions resulting from test inocula of 0.01 and 0.001 cc. were measured in millimeters 24 and 48 hours after the intracutaneous injections of culture. The relative degrees of cutaneous hypersensitivity are, therefore, expressed by the average diameter

and estimated height of the lesion resulting from these test doses at the stage of maximum development. The hair was removed with clippers, and areas on the hind legs were used for sensitizing injections, while freshly clipped regions on the sides were utilized for the test reactions. Specimens of blood for serum were obtained at the start of the experiment and on the fourteenth, twenty-first, and sixtieth days.

Intravenous injection of culture.—A Group A strain of hemolytic streptococcus (London MA) was utilized. Rabbits were injected on 4 succeeding days each week, with vaccine during the first 2 weeks and with living broth culture during the third to seventh weeks, inclusive. Each dose of vaccine was the equivalent of 1.0 cc. of culture; and the doses of culture were gradually raised from 0.5 cc. to 3.0 cc. The cultures were centrifuged and resuspended in sterile physiological saline, and vaccine was prepared by adding formalin in a final strength of 0.2 percent to a suspension concentrated to one-tenth the original volume in sterile physiological saline which was then allowed to remain 48 hours in the refrigerator. Specimens of blood were collected weekly from the rabbits receiving this treatment.

The administration of thyroxin.—A weighed quantity of thyroxin [3] moistened with a drop of 5 percent sodium hydroxide was rubbed into a paste and dissolved in sterile physiological saline to make a 0.1 percent solution. This was injected intravenously into rabbits thrice weekly in doses sufficient to prevent weight gain in infected animals. Although at the time of each injection all rabbits received the same quantity of thyroxin, it was necessary to vary the dosage level occasionally to obtain a continuously uniform effect. The variation in susceptibility to this hormone which necessitated change in dosage was apparently correlated with fluctuations in the atmospheric temperature; indeed, an increased susceptibility to thyroxin at higher temperatures has been demonstrated (*32*). The weekly dose per rabbit varied between 0.6 and 1.2 mg. of thyroxin.

Administration of desiccated thyroid.—Desiccated thyroid [4] was administered to guinea pigs by mouth thrice weekly in the form of a 12.5 percent suspension in water. The weekly dose, adjusted according to the criteria used for rabbits, varied between 0.3 and 0.75 gm.

Diet.—All animals were given "Purina complete" pellets, oats, hay, cabbage, and water daily. Appetite and thirst were increased in thyroid- and dinitrophenol-treated animals; and, although water was freely supplied to all animals, the food intake was regulated as follows: The approximate amount of each of the several articles of diet consumed by the controls during the preceding 24 hours was estimated, and the average amount consumed by these controls was fed to

[3] "Thyroxin Synthetic," Hoffman La Roche.

[4] "Thyroid glands desiccated," standardized to contain 0.3 percent of iodine in organic combination.

every animal. Each was offered at least 50 gm. of cabbage each day. Under these conditions, treated animals almost invariably ate all that was offered them. All were weighed three times a week.

Administration of dinitrophenol.—Rabbits were injected intravenously twice daily with a sterile aqueous solution containing 0.5 percent alpha 1-2-4 dinitrophenol in a total daily dose of 30 mg. per kg. of body weight. Individual rabbits varied greatly in their susceptibility to this drug, for 3 of 13 died after 1 or 2 days' treatment. The survivors, however, reacted in a most uniform manner and either failed to gain weight or lost slightly during the entire period of observation, even though the dosage was maintained at a uniform level. Because this diluted solution was very irritating it was necessary to avoid allowing any of it to escape into the tissues surrounding the vein injected.

Agglutinin titration.—Agglutinin titrations were performed in the usual manner; results were read after the tubes had remained in an incubator at 56° C. for 1 hour. To insure uniform results, all sera in each experiment were titrated simultaneously.

Precipitin titration.—In one experiment the sera were tested for the presence of anti-"M" precipitins. This fraction of the bacterial cell was prepared from hemolytic streptococcus group A strain "London MA"; and the precipitin reactions were performed following the method described by Lancefield (*33*).

Erythrocyte sedimentation rate.—The erythrocyte sedimentation rate in rabbit blood was determined as follows: Four parts of blood obtained from the marginal ear vein were diluted with one part of 3.8 percent sodium citrate solution. The mixture was then drawn up into a tube of 3.0 mm. internal diameter until a column 200 mm. high was obtained and the tube stood upright on plasticene. The length of the clear layer of serum was measured after the tubes had remained in a vertical position for 1 hour at room temperature.

Pathologic technique.—Animals which did not succumb were exsanguinated. In all cases all the organs and subcutaneous areas were examined in the gross with particular attention to the presence of infection, either spontaneous or induced. The heart and aorta of all animals were examined microscopically and also the lungs of all the guinea pigs. These organs were fixed in Zenker's solution, sectioned in paraffin, and stained with eosin-methylene blue and Van Gieson elastica stain. Before being embedded, each aorta was rolled so that the entire longitudinal extent was represented in each section. Several sections were made from each of the two blocks of the heart—one included the aortic valve and the other the mitral valve (occasionally the tricuspid) and portions of both ventricles.

RESULTS

EXPERIMENT 1. CHRONIC HEMOLYTIC STREPTOCOCCUS INFECTION IN RABBITS TREATED WITH THYROXIN

Sixty-nine rabbits were separated into 5 groups and treated as follows:

Group A.—Nine untreated served as controls.

Group B.—Eighteen were subjected to chronic hemolytic streptococcus infection only.

Group C.—Ten received intravenous injection of thyroxin only.

Group D.—Twenty-eight were subjected to the continued effects of chronic hemolytic streptococcus infection and intravenous thyroxin injections after the latter had been given for 3 to 140 days.

Group E.—Four were given thyroxin intravenously while chronic hemolytic streptococcus infection was present; but the latter had been maintained for 125 to 130 days before thyroxin was exhibited.

PATHOLOGIC CHANGES

Group A, controls.—The 9 control rabbits gained weight uniformly at an average rate of 6 grams per day and were apparently healthy. At autopsy no macroscopic pathological changes were evident. The hearts were normal microscopically except in two instances, where the lesions consisted of small, compact, bacteria-free collections of cells, occasionally in perivascular areas of the myocardium, but frequently subendocardial in location. These cell collections consisted chiefly of small lymphocytes with an occasional pseudoeosinophile. They were quite isolated and only one or two were present in any section of the heart. The myocardial muscle fibers showed no evidence of damage even in areas adjacent to the focal lesions.

Group B, infection only.—The 18 rabbits with chronic hemolytic streptococcus infection all developed abscesses in axillae and groins but gained weight at about the same rate as the controls, although the gain was temporarily arrested during periods of most active infection, and there was rapid antemortem loss in 5 which died. Four succumbed during the second, third, and fourth weeks of infection and one during the third month. In each of these rabbits the heart was the seat of acute, focal, purulent myocarditis and there were many circumscribed abscesses in which numerous gram positive cocci were present. Furthermore, in these animals macroscopic purulent lesions in other organs were frequently apparent. The remaining 13 members of this group were autopsied after 30 to 90 days of infection. Their organs were negative to gross examination, but in each animal there were 4 well-encapsulated, purulent abscesses in groins and axillae. Upon microscopic examination, cardiac lesions were observed in 5 of

the 13, a somewhat greater incidence than among the controls, and these lesions were somewhat more extensive and more numerous in the affected hearts. Furthermore, twice a slight degree of muscle fiber degeneration was evident adjacent to the cell collections, and in one instance small mononuclear cells were sparsely and diffusely scattered over wide areas in the myocardium. No correlation was apparent between the character or extent of the cardiac lesions and the duration of infection.

Group C, thyroxin only.—The 10 uninfected rabbits receiving thyroxin gained weight at about half the rate of the controls. There was some gain in body length evident, associated with moderate, progressive loss of subcutaneous fat. None of these animals died, and individuals were autopsied at intervals between 30 and 180 days' treatment. The only pathologic change macroscopically evident was a marked diminution or absence of fat. Four of the 10 hearts were normal on microscopic examination, but in the others the occurrence of damage could not be correlated with the duration of thyroxin administration. The microscopic cardiac lesions in 4 animals, examined after 40 to 80 days' treatment, were comparable in character and extent to those observed in the simple infected group (B). The heart of one animal after 80 days' treatment presented, in addition to round cell infiltration, a proliferation of fibroblasts in some of the small, focal, cellular accumulations, while the relative number of lymphocytes was reduced. In 3 rabbits examined between the 100th and 180th days of thyroxin injection only small patches of fibrosis were present, which corresponded in distribution and extent to the cell accumulations observed in the hearts of some members of the control (A) and the infected (B) groups, as well as to those in the hearts of 4 of the thyroxin-treated group (C) which had received injections for a shorter period of time.

Group D, infection and thyrotoxicosis.—Twenty-eight rabbits were subjected to the combined effects of chronic, focal, hemolytic streptococcus infection and the intravenous injection of thyroxin. Infection, however, was induced 3 to 140 days after the administration of thyroxin was begun. The trend of body weight was variable, but the final weight of those which survived for more than 1 month was usually about the same as at the beginning of the experiment. When infection was most active there were frequently sharp weight losses which were slowly regained in intervening periods. In the animals which succumbed after dissemination of the infection through the blood stream there was precipitous antemortem weight loss.

As indicated in table 1, 6 of the 28 rabbits in this group died with purulent focal, bacterial myocarditis, a relatively smaller number than among the members of group B with uncomplicated, chronic infection of the same type. In these animals neither the microscopic cardiac

changes nor the purulent lesions apparent in other organs on gross examination differed from those which developed in group B.

TABLE 1.—*Influence of thyroxin treatment and infection, separately and combined, upon cardiac pathology in rabbits*

Group	Treatment	Number of rabbits	Days duration of infection	Days duration of thyroxin treatment	Spontaneous death	Cardiac pathology
A	Untreated	9	None	None	None	All negative.
B	Infection only	5	14 to 70	do	5	Purulent carditis.
		13	90	do	None	All negative.
C	Thyroxin	10	None	30 to 180	do	Essentially negative.
D	Infection induced during course of thyroxin treatment.	4	10	18 to 125	All	Do.
		5	11 to 30	42 to 169	2 of 5	Severe nonpurulent carditis in over 50 percent.
		7	31 to 60	52 to 170	3 of 7	
		6	61 to 86	67 to 100	None	
		6	7 to 49	12 to 128	All	Complicated by purulent carditis.
E	Thyroxin treatment after infection established.	4	153 to 180	25 to 50	1 of 3	Essentially negative.

Of the remaining 22 rabbits in this group, 9 died, but, aside from abscesses in the groins and axillae, no purulent lesions were found in the internal organs and none was visible microscopically in the heart. On the other hand, rather extensive and characteristic microscopic, nonpurulent, cardiovascular lesions were found in 12 of the 22 animals, and in only 4 of the 19 which survived over one week were the hearts normal. The pathologic changes were as follows:

Myocardium.—The earliest changes observed are seen in rabbit No. 5 which had received thyroxin for 151 days but died 11 days after being infected. The essential lesion (fig. 7) was an edema involving the finest interstices between the muscle fibers, which were widened and occupied by material of an apparently "foamy" consistency. In these areas the capillaries were distended, presumably with serum, for they contained very few cells, and there was extensive perivascular edema. The staining of such areas with Van Gieson elastica (fig. 8) did not demonstrate the presence of any fibrillar structures in the interstices. This resembles closely the early changes in "serous myocarditis" described by Rössle (*16*) in the hearts of patients dying with Basedow's disease. Intermediate stages between this and established myocardial fibrosis, which have been demonstrated by Rössle, were not found in the material presented here.

In animals longer under the influence of thyroxin and infection there were extensive areas of myocardial fibrosis which consisted of stellate or elongated zones of proliferating fibroblasts rich in nuclear elements associated with degenerative changes in adjacent muscle fibers (fig. 9, rabbit No. 9, and fig. 10, rabbit No. 11, both infected for 30 days). The latter stained poorly with loss of internal structure and were of irregular size with indistinct outlines. In

animals still longer exposed to the influences of infection and thyrotoxicosis there were dense myocardial scars with few fibroblasts. Figure 11 (rabbit No. 15, infected for 60 days) shows perivascular scarring, while figure 12, representing an adjacent region stained with Van Gieson elastica, demonstrates the presence of adult connective tissue. Neighboring arterioles were usually thick-walled and showed considerable hypertrophy of the media (see figs. 13 and 14).

In thyroxin-treated rabbits infected for over 2 months, the areas of myocardial fibrosis were more dense (fig. 15, rabbit No. 20, infected for 86 days) and the muscle fibers remaining, while of irregular shape and distribution, no longer showed such extensive degenerative changes. In such areas multinucleated giant cells were frequently seen (fig. 16). These myocardial lesions are very similar to those which have been described in exophthalmic goiter and experimental hyperthyroidism.

Endocardium.—Lesions were rarer and less extensive in the endocardium than in the myocardium; however, they often appeared in conjunction with the latter. Apparently active processes, including fibrinoid degeneration and endocardial proliferation, were present only in rabbits which had been infected less than 50 days. The former change was rarely intense and not frequently present. A typical example appeared in the left ventricular endocardium of rabbit No. 13 which had been infected 49 days (fig. 3). In a small, sharply limited region, the endocardium was thick and possessed a fairly loose fibrillar structure with few deeply staining, homogenous, elongated nuclei. Irregular, fairly well defined areas, chiefly near the surface, were stained intensely with eosin and possessed a more homogenous, less fibrillar structure than adjacent parts. Here nuclei were more numerous, slightly larger, and not so intensely stained, many possessing eccentrically placed nucleoli. No lymphocytes, pseudoeosinophiles, or plasma cells were present. At times the missing endothelial surface was replaced by small fibrin clots. There was moderate interstitial edema of the subjacent myocardium. The appearance of perivascular lesions in this heart is described below.

Small areas of fibrinoid degeneration occurred in regions where active endocardial proliferation was apparently in progress. In the auricular endocardium of rabbit No. 7, which had been infected for 29 days, a localized area of endocardial proliferation developed in which such change was evident (fig. 4). The thickened endocardium and a small area of fibrinoid degeneration were of structure similar to that described in the preceding example. The endothelial layer, however, was intact and near the surface there was a more cellular area in which the fibrillar structure was disturbed. The nuclei in

this region were closely placed, large, irregular but not elongated, sharply outlined, and faintly but uniformly stained. In the adjacent endothelium nuclei were larger and more numerous than elsewhere, occasionally forming a double layer.

Fibrin deposits were sometimes extensive over areas denuded of endothelium. In such instances the subjacent endocardium was usually thickened and rich in nuclei, many of which sometimes appeared to be disintegrating. Such a lesion appeared in rabbit No. 6 which died after 11 days of infection (fig. 5). No bacteria were identified in such mural thrombi.

Areas of active endocardial proliferation, apparently not associated with other processes, were frequently observed. This occurred at the base of mitral valve in rabbit No. 5 which died after 11 days of infection. The considerably thickened mural endocardium was of fairly dense structure but presented no other abnormality except near the surface. A portion of this involved region is shown in figure 2. A definite endothelial layer was lacking but there was no fibrin deposit. Near the surface, deeply and uniformly stained, irregular nuclei were closely packed. No lymphocytes, pseudoeosinophiles, or plasma cells were present. Areas of myocardial edema in this heart, which have been described above, were subjacent.

In thyroxin-treated rabbits which had been subject to infection for longer than 50 days, no active endocardial lesions were seen. Occasionally regions of the endocardium, not sharply defined, were found to be considerably thickened and it is probable that these represented sites of earlier active inflammation.

Valves.—Slight valvular lesions varying little in their structure were not uncommon. The mitral valve of rabbit No. 11, which died after 43 days of infection, is a typical example (fig. 6). Subendocardial fibrinoid degeneration of slight degree was present along the superior surface with very little associated cellular reaction. There was little disturbance of structure except for an associated thickening of the endocardium and evidence of proliferation in the increased number of large, round or oval, faintly staining nuclei near the surface. No pseudoeosinophiles and no bacteria were found in the area.

Extensive valvular damage was rarely seen. However, near the base of the aortic valve in rabbit No. 20, which died after 86 days of infection, the lesion developed which is shown in figure 1.

Near the surface at the base of a thickened valve was a well-defined nodule, formed of cells with large, round or oval, deeply staining nuclei. Apparently an embolus had broken off from this area about 48 hours antemortem, when there was sudden hemiplegia due to plugging of a cerebral artery.

EXPLANATION OF PLATES [5]

FIGURE 1.—(A. M. M. 64844, rabbit No. 20. Received thyroxin for 100 days; infected for 86 days.) A somewhat nodular stromal proliferation in the aortic valve. The irregular cleft extending from the endocardial surface through the center of the lesion probably resulted from the displacement of a thrombus 48 hours before the death of the animal (see the text). Rather closely packed large, deeply staining nuclei surround an area of fibrinoid degeneration. (×175.)

FIGURE 2.—(A. M. M. 64849, rabbit No. 5. Received thyroxin for 151 days; infected 11 days.) Mural endocardial proliferation near base of mitral valve. The thickened endocardium possesses a fairly dense structure which is included here only in part. Deeply stained, irregular nuclei are closely packed near the surface but there are no infiltrating cells. (×655.)

FIGURE 3.—(A. M. M. 64870, rabbit No. 13. Received thyroxin for 170 days; infected 49 days.) Fibrinoid degeneration in the left ventricular endocardium over the interventricular septum. The endothelial surface is missing and replaced in some regions by small fibrin clots. Irregular areas in the endocardium near the surface stain rather intensely with eosin. Here, the nuclei are larger than elsewhere, more numerous, and less deeply stained. (×175.)

FIGURE 4.—(A. M. M. 64842, rabbit No. 7. Received thyroxin for 169 days; infected 29 days.) A localized area of auricular endocardial proliferation. The endocardium is thickened but the endothelial layer is intact. The fibrillar structure is disturbed in an area near the surface where large irregular, faintly stained nuclei are numerous. There is slight proliferation of the adjacent endothelium over a small area of fibrinoid degeneration. (×300.)

FIGURE 5.—(A. M. M. 64852, rabbit No. 6. Received thyroxin for 22 days; infected 11 days) Ventricular endocardium. Nuclei are numerous in the thickened endocardium. The endothelial surface is replaced by fibrin clot. (×660.)

FIGURE 6.—(A. M. M. 64863, rabbit No. 11. Received thyroxin for 64 days; infected 30 days.) Mitral valve. There is some subendocardial fibrinoid degeneration with very little associated cellular reaction. At the base of the valve there is slight endocardial proliferation. (×175.)

FIGURE 7.—(A. M. M. 64861, rabbit No. 5. Received thyroxin for 151 days; infected 11 days.) Early "serous inflammation" in the myocardium. "Foamy" edema of the interstices between muscle fibers is present. (×650.)

FIGURE 8.—(A. M. M. 64869.) Section adjacent to that shown in figure 7, here stained with Van Gieson elastica. Fibrillar structures are not visualized in the interstices. (×650)

FIGURE 9.—(A. M. M. 64860, rabbit No. 9. Received thyroxin for 42 days; infected 30 days.) Two areas of myocardial fibrosis in the left ventricle. In one probably younger area there is fibroblast proliferation and nuclei are numerous: in the other the connective tissue is more adult. Myocardial fibers adjacent to these regions show degenerative changes. (×100.)

FIGURE 10.—(A. M. M. 64853, rabbit No. 11. Received thyroxin for 64 days; infected 30 days.) An area of myocardial fibrosis in the left ventricle. The lesion is similar to that shown in figure 9, but there are strands of fibrosis and muscle fiber degeneration is more extensive.

FIGURE 11.—(A. M. M. 64845, rabbit No. 15. Received thyroxin for 74 days; infected 60 days.) Perivascular myocardial fibrosis. The connective tissue is of the adult type, and the walls of the vessel are apparently involved in the process. (×175.)

FIGURE 12.—(A. M. M. 64866.) Section adjacent to that shown in figure 11 here stained with Van Gieson elastica. (×185.)

FIGURE 13.—(A. M. M. 64862, rabbit No. 20. Received thyroxin for 100 days; infected 86 days.) Arterioles in myocardium. The vessels are hypertrophied and possess very muscular media. There is moderate myocardial fibrosis adjacent. (×175.)

FIGURE 14.—(A. M. M. 64865.) Section adjacent to that shown in figure 13 here stained with Van Gieson elastica. (×175.)

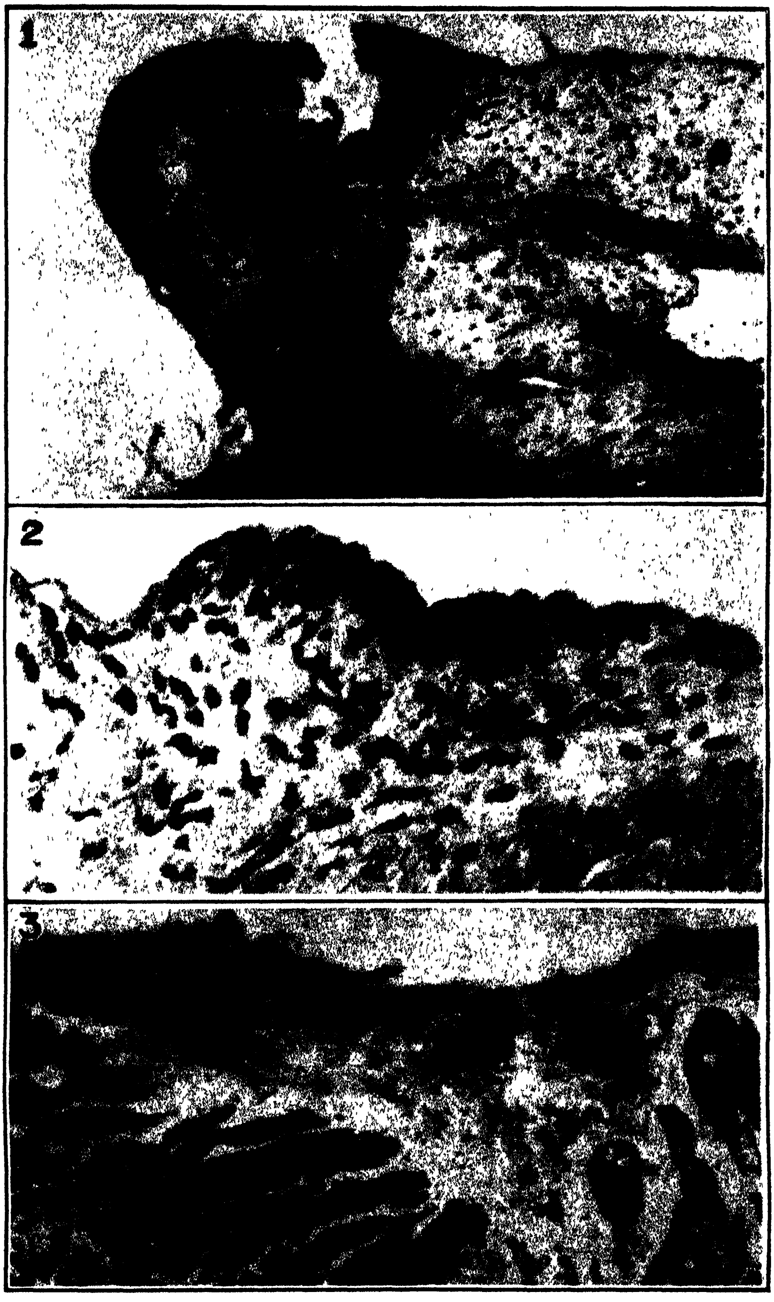
FIGURE 15.—(A. M. M. 64846, rabbit No. 20. Received thyroxin for 100 days; infected 86 days.) Myocardial fibrosis in the left ventricle. This probably represents a far advanced process for only a few muscle fibers remain and the connective tissue is of the adult type. (×175.)

FIGURE 16.—(A. M. M. 64864.) A high magnification of the region shown in figure 15. Multinucleated giant cells are present in the myocardial scar. (×605.)

FIGURE 17.—(A. M. M. 64851, rabbit No. 13. Received thyroxin for 170 days; infected 49 days.) Arteriole in the myocardium. Lymphocytes are diffusely scattered in the perivascular region. (×280.)

FIGURE 18.—(A. M. M. 64848, rabbit No. 5. Received thyroxin for 151 days; infected 11 days.) Arteriole in the myocardium. There is a small, irregular area of fibrinoid degeneration in the adventitia. The nuclei in this region are pyknotic and deeply stained. There is some localized endothelial proliferation but the media does not appear hypertrophic. (×355.)

[5] The author wishes to thank the staff of the Army Medical Museum for preparing the photomicrographs from which these illustrations were reproduced. Figures here following the abbreviation, "A. M. M.," indicate the number of the original picture on file in the Museum. Unless otherwise noted, sections were stained with hematoxylin-eosin.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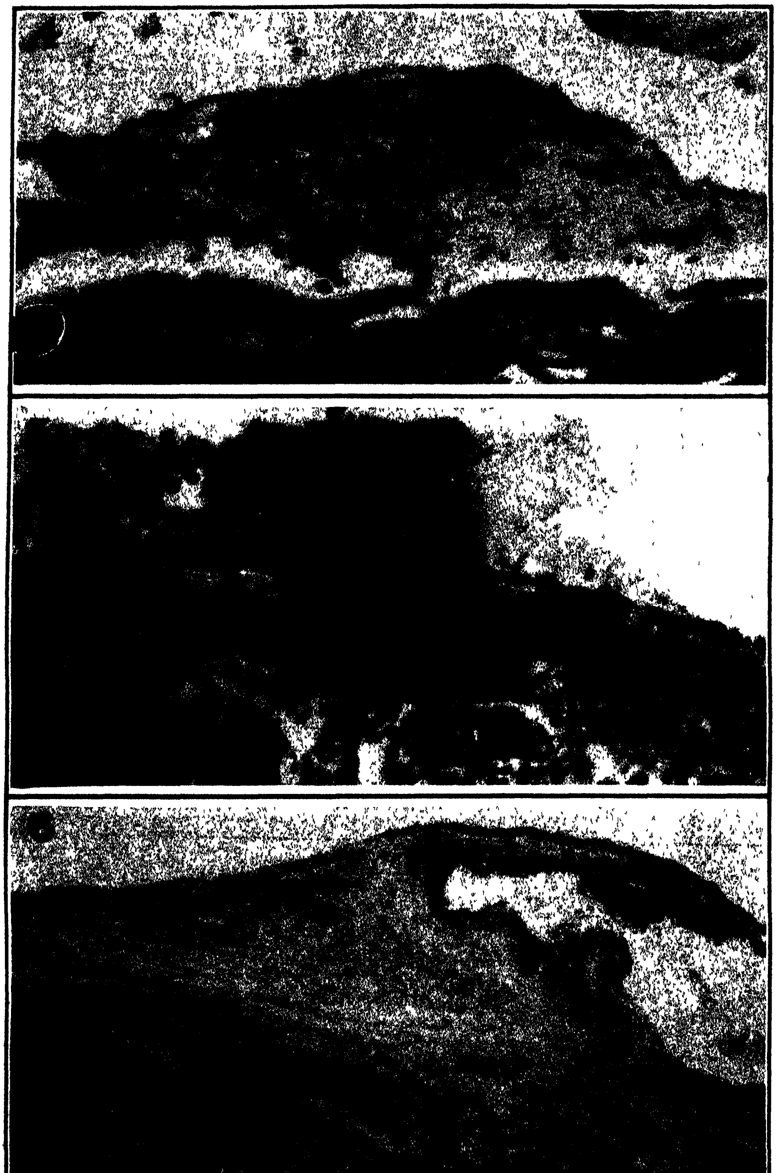
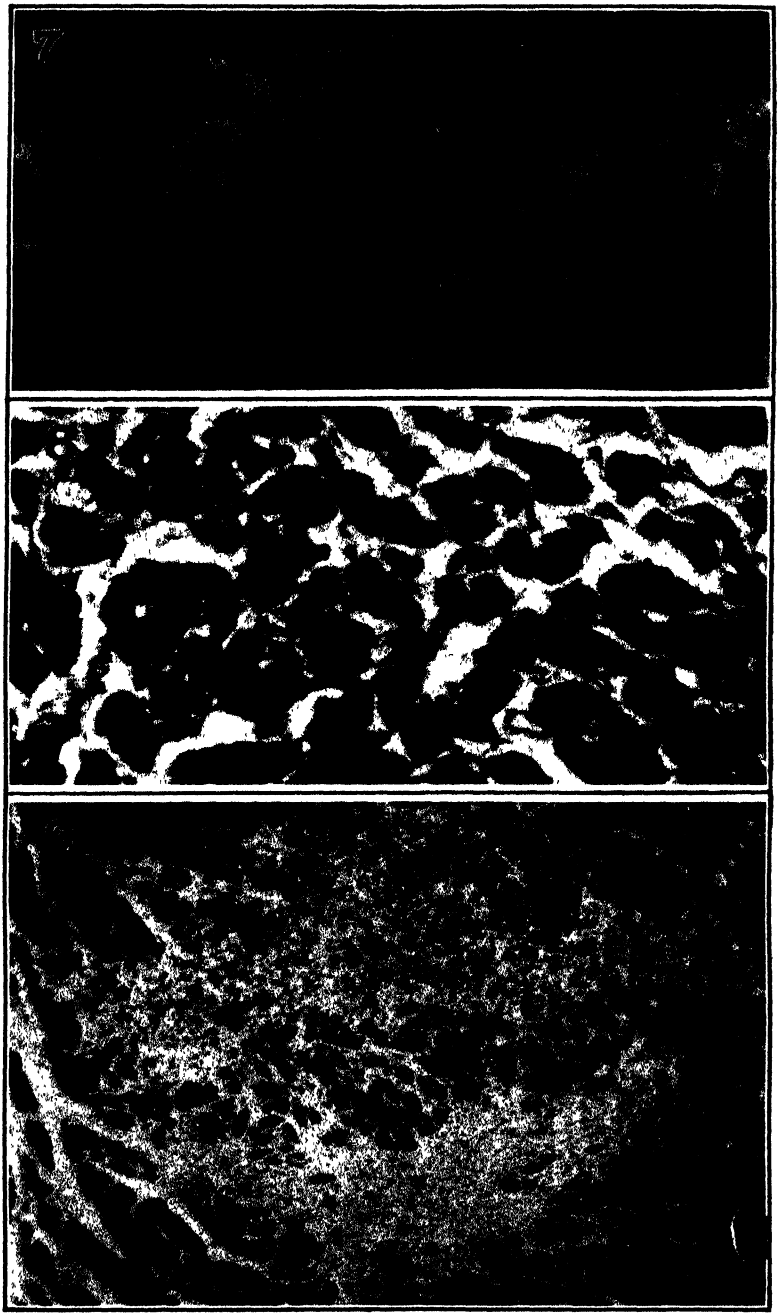




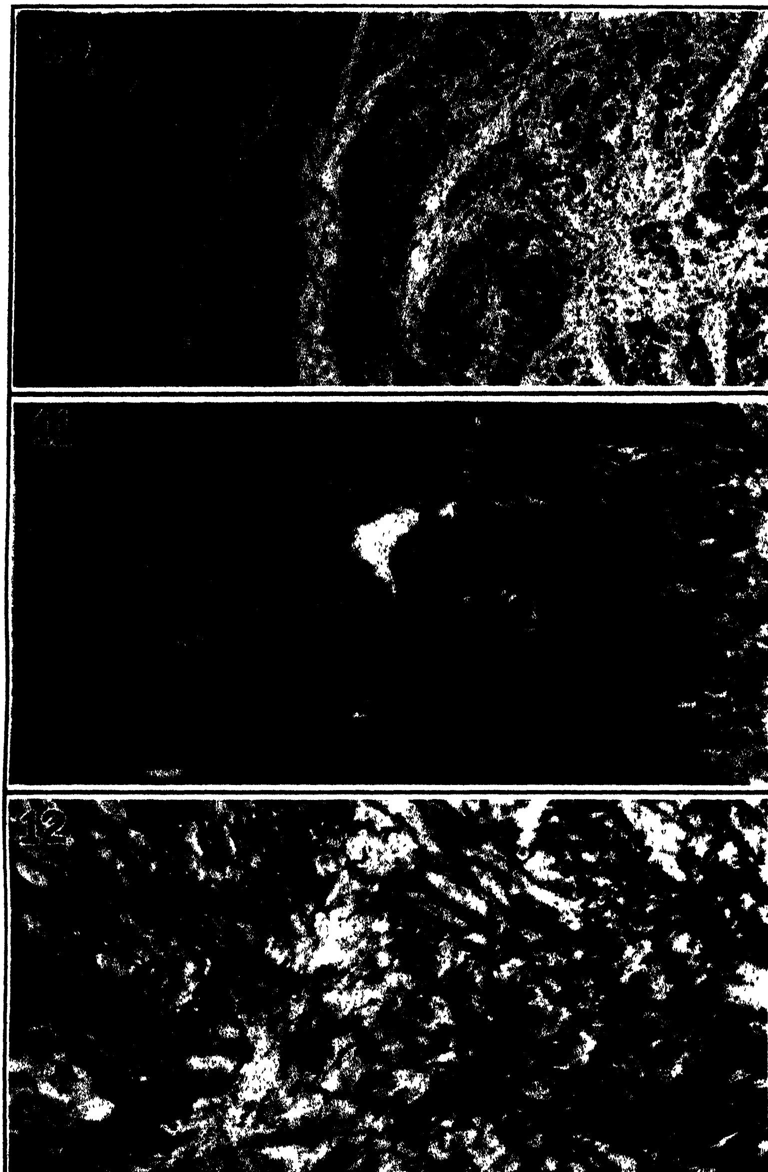
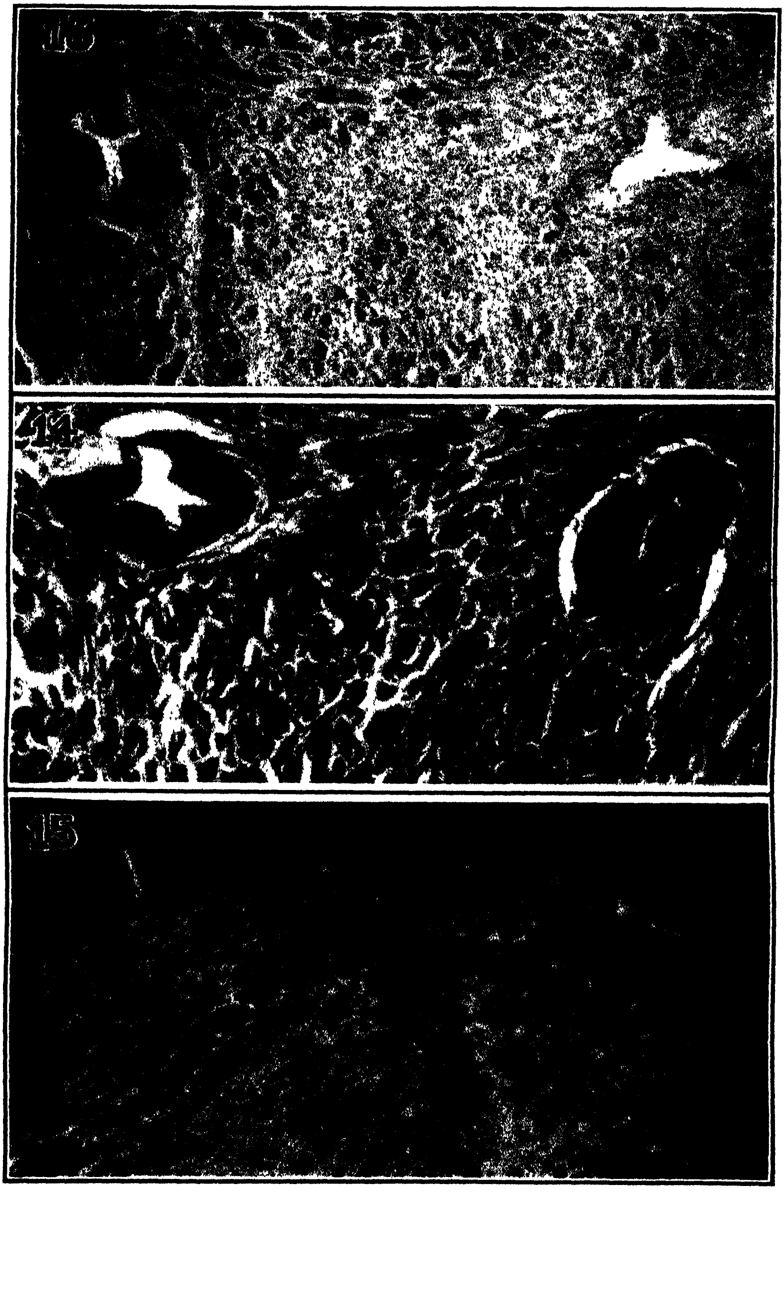


PLATE V



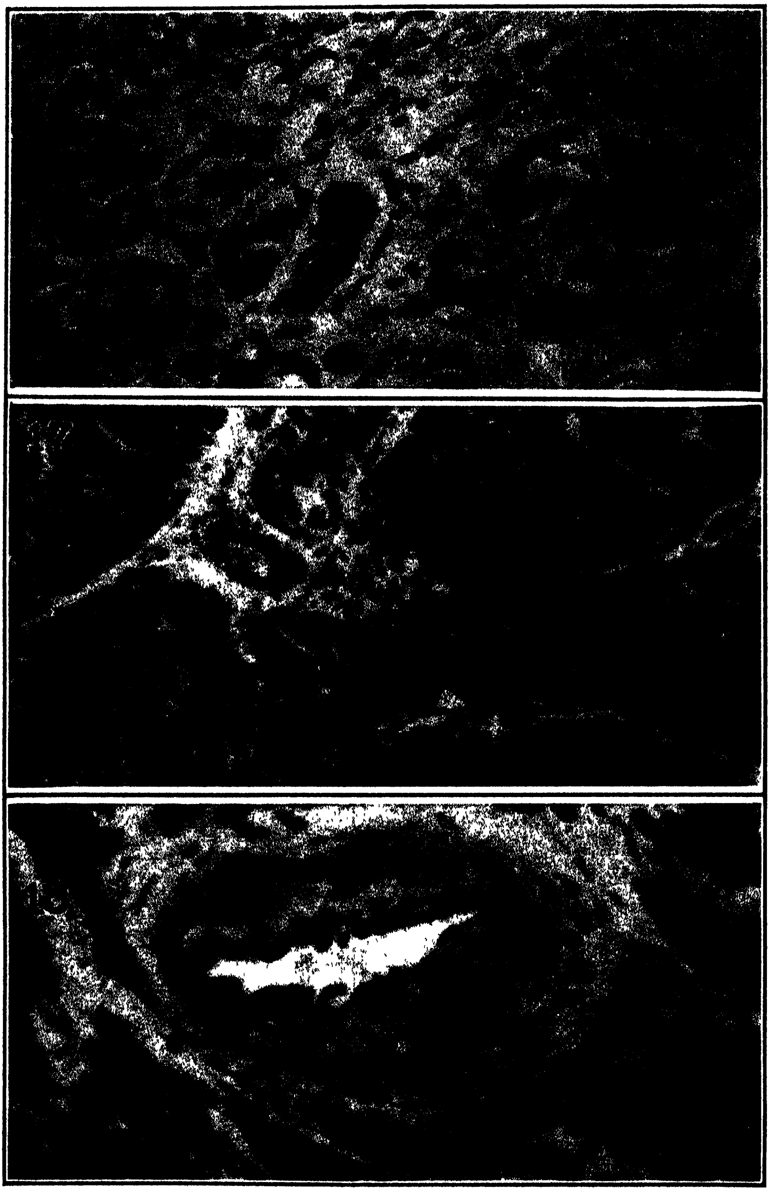
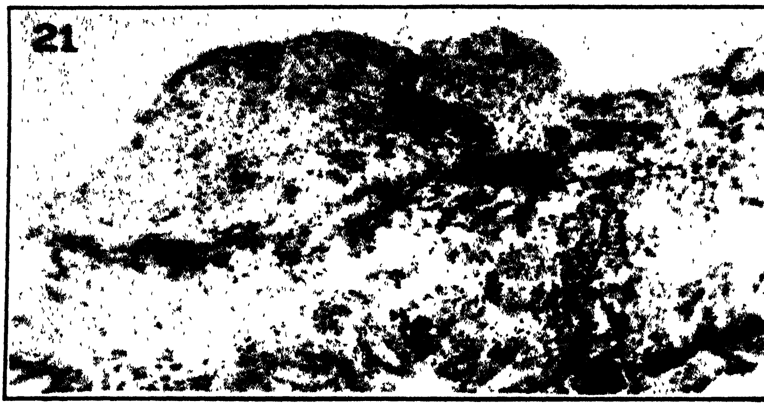


FIGURE 19—(A M. M. 64857, rabbit No. 7. Received thyroxin for 169 days; infected 29 days.) Internal surface of the pericardium. The membrane is thickened and near the surface lymphocytes are diffusely scattered while there are numerous round, faintly staining nuclei with conspicuous nucleoli. (X660.)

FIGURE 20—(A. M M. 64850, rabbit No 8 Received thyroxin for 42 days; infected 30 days.) Disruption of structure near the internal surface of the aortic media. (X660.)



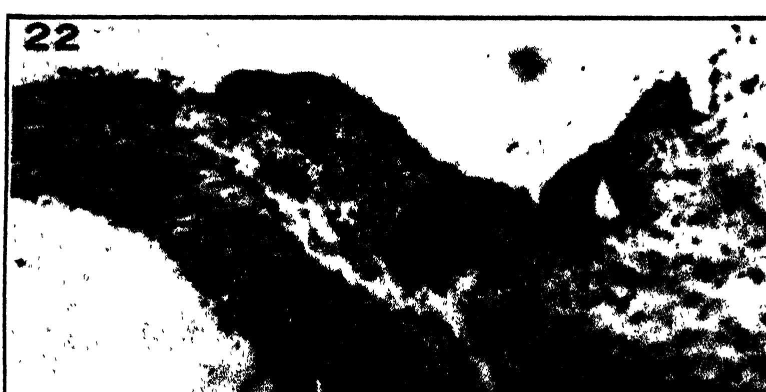


FIGURE 21.—(A. M. M. 04859, guinea pig No. 9. Received desiccated thyroid for 85 days; infected 60 days.) Ventricular endocardium. A circumscribed proliferation of the endocardium containing an accumulation of lymphocytes Lymphocytes are also scattered in the subjacent myocardium. (×100)

FIGURE 22.—(A M. M. 64867, guinea pig No. 5. Received desiccated thyroid for 87 days; infected 35 days) Base of the mitral valve. There is localized endothelial proliferation with leucocytic infiltration. (×230.)

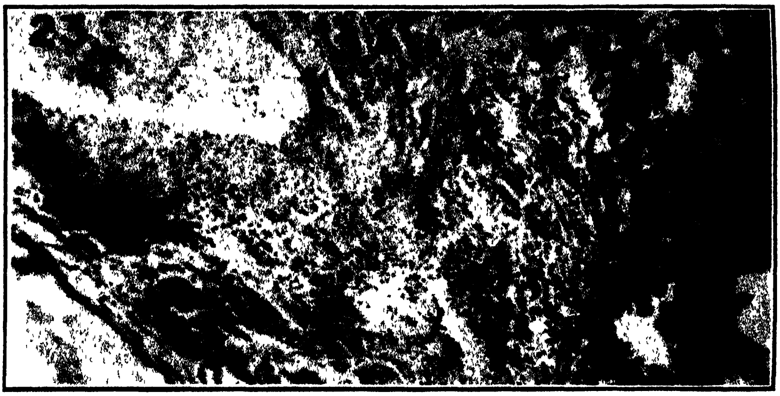
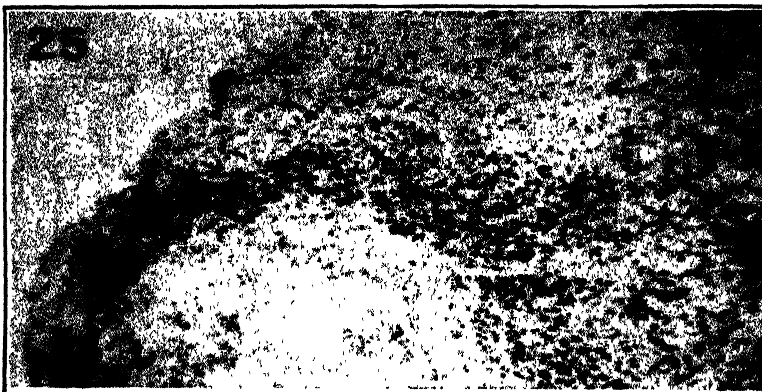


FIGURE 23.—(A. M. M. 64858, guinea pig No. 10. Received desiccated thyroid for 86 days; infected 61 days.) Base of the mitral valve. Lymphocytes are accumulated in the valve and diffusely scattered in the adjacent myocardium. (X100.)

FIGURE 24.—(A. M. M. 64856, guinea pig No. 13. Received desiccated thyroid for 87 days; infected 62 days.) Myocardium. Over a circumscribed area, there is degeneration of all muscle fibers. A few diffusely scattered lymphocytes are at the borders of this lesion. (X100.)



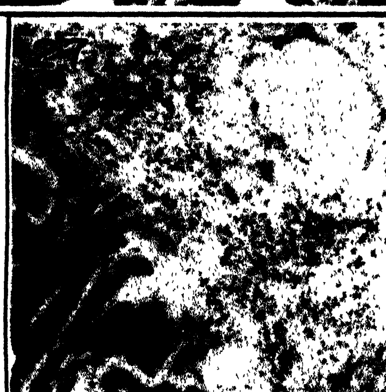


FIGURE 25.—(A. M. M. 64854, guinea pig No. 9. Received desiccated thyroid for 85 days; infected 60 days.) Pericardium. The pericardium is thickened, due in part to fibroblast proliferation. Lymphocytes are distributed through the deeper tissue. (×100.)

FIGURE 26.—(A. M. M. 64855, guinea pig No. 8. Received desiccated thyroid for 85 days; infected 60 days.) Auricular epicardium. There is proliferation of fibroblasts in the thickened epicardium where lymphocytes are diffusely scattered. (×165.)

FIGURE 27.—(A. M. M. 64847, guinea pig No. 10. Received desiccated thyroid for 87 days; infected 62 days.) Coronary vein. There is perivascular edema with diffusely scattered lymphocytes and plasma cells. (×100.)

Epicardium and pericardium.—These structures in only three instances were the sites of similar lesions consisting of small, rather sharply defined areas in which lymphocytes were diffusely distributed near the surface of the thickened membrane. Many round, faintly staining nuclei with small but conspicuous nucleoli were also present (fig. 19).

Blood vessels.—Arteriolar hypertrophy, characterized by thickened media, was frequently observed, and has been described in association with myocardial lesions. Less extensive alterations were found in otherwise uninvolved portions of the myocardium. In the adventitia small, poorly defined, localized lesions were sometimes present. Usually the change was limited to the occurrence of a few pyknotic nuclei in an irregular area of fibrinoid degeneration. Occasionally, however, one or two giant cells with large, pale, vesicular nuclei were seen about the border. Such a lesion is illustrated in figure 18. Slight, localized, endothelial proliferation was also observed as shown in the same figure. Diffuse, perivascular accumulations of lymphocytes were frequently seen (fig. 17).

No pathological changes were found in the larger, more proximal coronary branches. In four instances, however, localized lesions of the inner one-third of the aortic media were seen, usually in the ascending portion. In these areas the fibrillar structure was disrupted and irregular, densely staining nuclei, resembling those of uninvolved regions of the media, were closely packed together. Nuclear fragments were thickly interspersed, but no bacteria or other cellular elements were identified (fig. 20). No other lesions of the aorta were found in any group.

Group D.—The hearts of two of the four rabbits in which infection had been maintained for 125 to 130 days before thyrotoxicosis was induced were essentially negative (table 1). In the remaining two, however, there were lesions comparable in character and extent to those observed in the four affected hearts of rabbits receiving thyroxin only for less than 80 days (group C).

The results indicate that chronic focal hemolytic streptococcus infection of the type employed has slight effect upon the hearts of untreated rabbits unless a blood-stream infection supervenes, in which case purulent, focal myocarditis develops. The latter complication occurs less frequently in thyroxin-treated rabbits subject to the same type of infection; on the other hand, extensive nonpurulent carditis does appear in such animals. Thyroxin given to uninfected rabbits in corresponding doses induces only minor alterations in the heart. When infection has become well established before thyroxin treatment is begun similar minor lesions are induced.

OTHER EVIDENCES OF AN ALTERED RESPONSE TO INFECTION IN THYROIDISM

Body temperature.—The rectal temperature of representatives of each group, except group E, was taken each afternoon for about 2 weeks following the induction of infection. The data on animals which were later found to have developed bacteriemia were disregarded. The thyroxin-treated, infected rabbits were more frequently febrile than those in which the infection was uncomplicated and the average temperature in the latter group was slightly lower. Those receiving thyroxin but not infected occasionally showed a slight elevation of temperature.

Erythrocyte sedimentation rate.—The erythrocyte sedimentation rate was determined in representatives of each group at intervals of approximately 2 weeks. Here also figures from rabbits with bacteriemia were discarded, leaving for consideration the results of 219 observations on 54 animals. Sedimentation rates more rapid than 3 mm. per hour were not observed in the controls. Over three-fourths of the infected animals had increased rates, usually to 20–25 mm. per hour, about half the time during the period of observation. Although thyroxin treatment did not discernibly affect the results in infected animals, those receiving thyroxin only occasionally developed slightly accelerated rates.

Agglutinins.—The agglutinin titer in the sera of representatives of each group for streptococcus (K158b) was determined fortnightly, again excluding animals with bacteriemia. Agglutinin titers ranged from 1:4 to 1:8,192, and positive reactions were observed somewhat earlier during the course of infection in the thyroxin-treated, infected animals than in those with uncomplicated infection. Thyroxin treatment, however, apparently did not influence the ultimate concentration of antibody attained.

EXPERIMENT 2. EFFECTS OF INTRAVENOUS INJECTION OF HEMOLYTIC STREPTOCOCCI IN THYROXIN-TREATED RABBITS

The fact that in response to chronic, focal, hemolytic streptococcus infection, thyroxin-treated rabbits developed antibodies somewhat earlier than untreated animals suggested that their response to intravenous immunization might also be altered. To investigate this possibility, the group A hemolytic streptococcus strain London MA was selected. Although intravenous injections of this strain regularly induce agglutinin development, rabbits vary considerably in their production of corresponding anti-M precipitins.

The following groups of rabbits were included in this experiment:

Group A.—Nine untreated rabbits served as controls.

Group B.—Six received intravenous injections of vaccine, followed by living culture, for 7 weeks.

Group C.—Five received injections of vaccine or living streptococci in doses equivalent to those given members of group B but meanwhile also received thyroxin intravenously.

Blood sera were tested weekly for anti-M precipitins and agglutinins for strain London MA. The former antibody appeared in no instance, although agglutinin titers rose rather irregularly in groups B and C as high as 1: 3,200. After 7 days agglutinins were present only in one thyroxin-treated animal, and after 14 days serum from two members of this group showed a titer of 1: 3,200, although a titer of this height was not demonstrated in the untreated group until the twenty-first day. At this time, however, there was no definite difference between the two groups with respect to agglutinin concentration and no further differences were observed.

At autopsy no alterations were apparent to examination in the gross except a diminution of fat in the thyroxin-treated group. Microscopically, in three of the nine controls lesions similar to those in the corresponding group of experiment 1 were observed. In half the otherwise untreated rabbits receiving bacteria intravenously (group B) the hearts were negative, while in five, lesions comparable to those seen in the infected group of experiment 1 were apparent. There was extensive myocardial fibrosis in the hearts of all the thyroxin-treated rabbits receiving culture intravenously. Over large areas of the myocardium the parenchyma was replaced by connective tissue of the adult type. The endocardium was thickened over irregular areas, but no active lesions were observed. Arterioles were thick-walled and showed distinct hypertrophy of the media.

EXPERIMENT 3. THE RESPONSE OF THYROXIN-TREATED RABBITS TO BACTERIAL HYPERSENSITIZATION

Inasmuch as bacterial hypersensitivity develops during the course of focal infection of the type employed in experiment 1, it was of interest to study the response to bacterial hypersensitization in thyroid-toxic rabbits. A strain of indifferent streptococcus (K155) which had been found effective in inducing hypersensitivity was employed.

The following groups of rabbits were treated in the manner described in the section on "Methods":

Group B.—Six were rendered hypersensitive.

Group D.—Five were rendered hypersensitive while receiving thyroxin intravenously.

Because this experiment was run concurrently with experiment 1, the untreated group A and the group receiving thyroxin only (group C) in that experiment served as controls with respect to the pathological findings here.

The degree of cutaneous sensitivity to the strain employed was tested at the outset of the experiment and after 14, 21, and 60 days. Mod-

erate cutaneous hypersensitivity was demonstrable in groups B and D after 2 weeks but was more pronounced after 3 weeks. During the succeeding month of observation, sensitizing doses of bacteria were given only at infrequent intervals. This degree of hypersensitivity persisted until the end of the experiment. At the beginning of the experiment when cutaneous reactivity was first tested and at each succeeding observation as hypersensitivity developed, the lesions of thyroxin-treated animals were found to be smaller and less edematous than those of the untreated rabbits. They also regressed more rapidly and with healing became more indurated. Agglutinin titers in the two groups were comparable.

The animals were killed after 60 days of observation. Their internal organs were negative to examination in the gross except for the lack of fat in members of group D. Microscopically the hearts in group B were similar to those in the infected group (B) in experiment 1. The microscopic cardiac lesions in group D both at 59 and 70 days were similar to those observed in group D of experiment 1 in rabbits which had been infected from 11 to 30 days.

EXPERIMENT 4. THE RESPONSE TO CHRONIC HEMOLYTIC STREPTOCOCCUS INFECTION IN GUINEA PIGS RECEIVING DESICCATED THYROID ORALLY

Chronic infection was induced by strain J20 of group C hemolytic streptococcus in guinea pigs receiving desiccated thyroid orally. The following groups were observed:

Group A.—Twenty untreated guinea pigs served as controls.

Group B.—Thirty guinea pigs were subjected to the influence of chronic hemolytic streptococcus infection only (including 4 with chronic spontaneous hemolytic streptococcus adenitis).

Group C.—Ten guinea pigs received desiccated thyroid by mouth.

Group D.—Thirteen guinea pigs were subjected to the combined effects of chronic hemolytic streptococcus infection and desiccated thyroid orally, after the latter had been administered for 25 days.

Group E.—Thirteen guinea pigs suffering from spontaneous hemolytic streptococcus adenitis were given desiccated thyroid by mouth.

Group A, controls.—In view of the frequency of spontaneous hemolytic streptococcus infection in the guinea pigs available, care was taken that individuals comprising this group were healthy. The criteria for the absence of infection were as follows: Continuous gain in weight (the animals were not mature), absence of clinical signs on semiweekly examination, and negative macroscopic postmortem observations, supplemented by a microscopic study of sections of the lungs. Half the animals in this group presented no discernible cardiac lesions, while in the other half the changes were minimal. Most commonly seen were small, compact, localized accumulations of mononuclear cells (sometimes associated with a few eosinophiles) in the mural

endocardium and occasionally extending beneath it, but without evidence of damage to adjacent myocardial fibers. Such foci were multiple and were observed in the walls of all the chambers, although only a few were seen in one heart; a predilection for the papillary muscles of the left ventricle was evident. Similar collections were occasionally present in the myocardium where they were limited to a few mononuclear cells, occasionally in perivascular location. Pericardial lesions were invariably perivascular and consisted of a few sparsely scattered lymphocytes and mononuclear cells; in one instance eosinophiles were also present. The only other cardiac lesions presented in the control group were occasional small, recent myocardial hemorrhages.

Group B, infection only.—Infection was induced in 26 guinea pigs. Six which died were found to have acute, focal, purulent myocarditis. Of the remaining 20 animals, none died during an 85-day observation period. Four with chronic spontaneous hemolytic streptococcus lymphadenitis when they came under observation were observed for a period of 60 days. None of the latter died and none developed purulent carditis.

In the hearts of these 30 infected animals, with the exception of the 6 developing purulent carditis, lesions were observed similar to those in the control animals. Although they were slightly more extensive here, a discernible difference in the character of the lesions was evident only in the instances of spontaneous infection. In those cases eosinophiles were invariably present in the small, cellular accumulations occasionally noted in the mural endocardium.

Group C, desiccated thyroid only.—No evidence of infection was found in this group. One animal died after 22 days and the remainder were killed at intervals between the fifty-first and eighty-sixth days. In about half of these animals the heart showed changes comparable in character and extent to those observed in the uninfected control group (A).

Group D, desiccated thyroid and induced chronic infection.—No member of this group died; the viscera were macroscopically normal and no purulent myocarditis was observed. As in the rabbits, metastatic infection was less frequent in thyroid-toxic than in untreated animals. Members of this group were killed at intervals between the fifty-second and eighty-seventh days.

The myocardium was less extensively involved than in rabbits similarly treated, and the lesions were in an early stage of development. A typical example was found in the heart of guinea pig No. 13 (fig. 24). Over a rather sharply delimited area the muscle fibers showed advanced degenerative changes. The borders of individual fibers as well as their internal structures were indefinite and only a

few pale nuclei remained. At the periphery of such areas there were diffuse accumulations of lymphocytes and plasma cells.

Endocardial lesions were not uncommon; the most frequent alteration consisted of collections of lymphocytes and plasma cells diffusely scattered through this layer and the subjacent myocardium or distributed in dense seams underneath the endothelium or at the endocardial-myocardial junction. Lesions of the latter type were most common in the auricles. Circumscribed endocardial proliferations were found in both auricle and ventricle. A characteristic example of such involvement in the latter location was found in guinea pig No. 9 (fig. 21). Over a sharply delimited region the endocardium was much thickened. The rather homogenous tissue toward the endocardial surface showed no fibrillar structure and contained many, large, elongated, pale nuclei with a line of granular stippling along their longitudinal axis. At the base of this nodular thickening there was active fibroblast proliferation; and a rather closely packed accumulation of lymphocytes occupied part of the intermediate region.

Valvular lesions were found exclusively at the base of the mitral and consisted of cellular infiltration or endocardial proliferation. A lesion of the former type was found in guinea pig No. 10 (fig. 23). In the adjacent myocardium, in the connective tissue and interstices between the muscle fibers, and extending up the base of the valve, lymphocytes and plasma cells were diffusely scattered or gathered in rather dense clumps. There was some associated fibroblast proliferation. Proliferation of the endothelium at the base of the mitral valve, as seen in guinea pig No. 5 (fig. 22), was also common.

Epicardial and pericardial lesions were more usual than in rabbits similarly treated. Lymphocytes and plasma cells were diffusely scattered or, in the pericardium, more densely distributed in a seam under the endothelium. A moderate degree of fibroblast proliferation was usually associated with these lesions (figs. 25 and 26).

Granulomatous perivascular formations were not seen. In this locality also diffuse or compact accumulations of lymphocytes and plasma cells constituted the only type of lesion (fig. 27).

Group E, treatment with desiccated thyroid after the establishment of infection.—Four members of this group died between the seventeenth and twenty-ninth days of treatment while the remaining nine animals were killed at intervals between the forty-fourth and fifty-eighth days. The internal organs were all macroscopically normal and there was no purulent myocarditis. The microscopic cardiac lesions, however, were of slight degree and corresponded in frequency and character to those seen in uncomplicated spontaneous infection (group B).

EXPERIMENT 5. CHRONIC HEMOLYTIC STREPTOCOCCUS INFECTION IN RABBITS TREATED WITH DINITROPHENOL

In order to study the influence upon the response to infection of an accelerated metabolic rate dissociated from other thyroxin effects, rabbits were given maximum doses of dinitrophenol. Four groups were investigated:

Group A.—Six rabbits receiving no treatment served as controls.

Group B.—Ten rabbits were infected using the methods of experiment 1.

Group C.—Five rabbits received dinitrophenol intravenously.

Group D.—Five rabbits, infected as those in group B, received dinitrophenol as those in group C, beginning 2 days before the infection was instituted.

Three animals of thirteen from which groups C and D were later formed died during the first 2 days of treatment and 3 in group B succumbed after they had been infected. Dinitrophenol treatment caused the rabbits in groups C and D to remain stationary in weight or to lose slightly, a more pronounced effect than that obtained from thyroxin in the dosage employed in experiment 1. Individuals were autopsied at intervals between the forty-sixth and seventy-sixth days of treatment. Aside from the inguinal and axillary abscesses in members of groups B and D, no lesions were apparent upon examination in the gross although there was little fat in the dinitrophenol-treated individuals. Upon microscopic examination, purulent, focal myocarditis was found in the 3 infected animals which succumbed. The incidence, character, and extent of minor cardiac lesions in groups A and B corresponded to those observed in comparable individuals of experiment 1, while the findings in group D differed in no particular from those in group B. Thus, treatment with dinitrophenol failed to induce cardiac lesions of itself or in combination with infection.

DISCUSSION

Attention has been drawn to the resemblances between the cardiac lesions which have been observed in experimental hyperthyroidism and those of rheumatic fever (*28*, *34*). This is of particular interest because of the tendency for the latter disease and exophthalmic goiter to develop in the same individuals (*35*). The endocardial, perivascular, and pericardial lesions which have been described here, however, only remotely resemble those of rheumatic fever in that fibrinoid degeneration, connective tissue proliferation, and endocardial destruction and proliferation were present with an occasional multinucleated giant cell while polymorphonuclear leucocytes or pseudoeosinophiles were rare. Few granulomatous lesions were seen and none developed sufficiently to warrant comparison.

Myocardial fibrosis, very similar in appearance to that which has been described in exophthalmic goiter, was the most common and extensive change observed. This suggests that infections during the course of activity of this disease may result in the development of permanent cardiac damage and emphasizes the desirability of early operative treatment for hyperthyroidism.

The pathogenesis of cardiac lesions developing in animals suffering infection during treatment with thyroid products is not clear. Those who have observed similar pathological changes resulting from apparently uncomplicated, experimental hyperthyroidism have concluded variously that the damage resulted from a direct toxic effect of the thyroid hormone on the myocardium or that it was indirectly incident to overwork of the organ. Our investigations do not exclude the possibility that cardiac lesions may be induced by intense uncomplicated hyperthyroidism operating through such mechanisms, for those who have reported the development of pathological changes in experiments of this kind, apparently not complicated by infection, gave relatively larger doses of active thyroid products than were employed here. It is improbable, however, that the lesions induced in the present experiments were due simply to intensification of the thyroid effect by infection because no unusual pathological changes were observed in the hearts of either rabbits or guinea pigs in which infection was well established before thyroidism was induced. The size of the subcutaneous abscesses and the trend of body weight, however, in these animals indicated that they were exposed to the effects of infection equivalent in intensity to those experienced by animals which were infected after thyroidism had been induced and which consequently developed cardiac lesions. The fact that infection was found not to intensify the minor lesions induced in rabbits and guinea pigs by repeated doses of adrenalin (*36*) is further indication that cardiac overwork of itself does not render the heart susceptible to damage incident to the type of infection employed here. This also suggests that the conditioning effect of thyroxin and dried thyroid was not mediated by stimulation of the sympathetic system.

Alterations of biochemical relationships which have been found in the heart during thyroidism and which might be responsible for altered reactivity in infection include a reduced content of creatin (*37*), phosphates (*34*), adenyl-pyrophosphoric acid (*38*), and glycogen (*39, 40, 41*), and an increased concentration of lactic acid (*42*) and nonprotein nitrogen (*43*). It is probable, however, that a general altered reactivity of the entire body plays a part as reflected by the slightly enhanced antibody formation during infection and intravenous immunization with hemolytic streptococcus in thyroxin-treated rabbits. We have also demonstrated a comparable, relative increase in antibody production rate in thyroxin-treated rabbits

injected with horse serum (*44*), while Blom (*45*) observed that thyroidism increased the susceptibility of guinea pigs to anaphylactic shock.

The concentration of agglutinins developing during the course of bacterial hypersensitization was not found to be affected by treatment with thyroid products. It has been demonstrated, however, that humoral antibodies are quite irregularly associated with the state of bacterial hypersensitivity (*46*), while in their concentration there they never represent the potential maximum response of the individual. In bacterial hypersensitivity, as in hypersensitivity to horse serum (*44*) in rabbits, the influence of thyroidism is manifest by the relatively small size of the cutaneous lesions and their comparatively rapid evolution.

The fact that treatment with dinitrophenol did not produce an effect similar to that of thyroxin or desiccated thyroid indicates that increased metabolic rate alone is not responsible for the apparent conditioning effect of the latter substances. The factors which predispose to the development of nonpurulent carditis as a complication of infection, however, are probably associated with a state of accelerated metabolism, for lesions of this type also appear in the hearts of infected scorbutic (*47*, *48*, *49*) and insulin-treated guinea pigs (*50*). The effect of insulin in accelerating carbohydrate metabolism is recognized, while the preponderance of evidence indicates that the metabolic rate is elevated in scurvy (*51*). When the degree of thyroid hyperactivity is further increased in the latter condition by exposure of the affected animals to ultraviolet radiation (*52*), we have found that the concurrent presence of infection induces more severe cardiac lesions than those which appear in guinea pigs similarly treated but not irradiated (*53*).

On the other hand, the numerous reports of an essentially antagonistic relationship between thyroxin and ascorbic acid in their physiological effects (*38*, *54*, *55*) suggest that the alterations in response to infection observed may have been due to a vitamin C deficiency incident to the depleting effects of treatment with thyroid products. This possibility is strengthened by the observation that the onset of scurvy in guinea pigs is hastened by the concurrent feeding of thyroid gland (*56*). The fact that each treated animal in these experiments consumed at least 50 gm. of fresh cabbage daily, however, probably eliminates this factor, for the minimum amount which has been found to protect guinea pigs against scurvy is only 5 gm. (*57*).

Both indifferent and hemolytic streptococcus infections were effective in inducing nonpurulent carditis in thyroid-treated animals. The absence of pathological change in the hearts of individuals exposed to thyroidism after infection was established, however, suggests that for the production of carditis of this type, it is necessary for the infected

animal while in a state of thyroidism to pass through a stage of immunization or hypersensitization. Since the induction of both immunity and hypersensitivity were found to be effective in inducing nonpurulent carditis under these conditions, the precise nature of the influence of infection remains obscure.

SUMMARY

1. Chronic, focal, hemolytic streptococcus infection, intravenous immunization with this micro-organism, or the induction of cutaneous hypersensitivity to indifferent streptococci, while of slight effect upon the hearts of untreated rabbits, are associated with the development of extensive, nonpurulent carditis in members of this species treated with thyroxin. A similar relationship between chronic, focal, hemolytic streptococcus infection and the feeding of desiccated thyroid is demonstrable in guinea pigs. Equivalent doses of thyroid products in the absence of infection, or given after infection is well established in these species, induce only minor cardiac lesions. Chronic, focal, hemolytic streptococcus infection in rabbits with elevated metabolic rates induced by dinitrophenol treatment is also ineffective in this respect.

2. The myocardial changes resemble those described in exophthalmic goiter and, by some observers, in apparently uncomplicated experimental thyroidism. The endocardial, perivascular and pericardial lesions only remotely resemble those of rheumatic fever, but include fibrinoid degeneration, proliferation, and destruction without the presence of purulent inflammation.

3. In thyroxin-treated rabbits infected subcutaneously or injected intravenously with hemolytic streptococci, agglutinins appear somewhat earlier than in those untreated. The cutaneous lesions induced during the course of hypersensitization to indifferent streptococci are smaller and evolve more rapidly in thyroxin-treated rabbits than in controls, but cutaneous hypersensitivity develops in both groups and the concurrent concentration of agglutinins is apparently not influenced by treatment.

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SIMILARITY OF AUSTRALIAN "Q" FEVER AND A DISEASE CAUSED BY AN INFECTIOUS AGENT ISOLATED FROM TICKS IN MONTANA [1]

By R. E. DYER, *Senior Surgeon, United States Public Health Service*

In 1935 a filter-passing agent was recovered by Davis and Cox (*1*) from ticks (*Dermacentor andersoni*) collected near Nine Mile Creek, about 32 miles west of Missoula, Mont. This agent was shown to pass Berkefeld filters N and W which were impermeable to ordinary bacteria and to the viruses of typhus and Rocky Mountain spotted fever. Cox (*2*) has so far been unable to cultivate the filter-passing agent on media free from living cells, but has found that it multiplies freely in tissue cultures. He has described rickettsialike organisms which are present in abundance in tissues of infected guinea pigs and in tissue cultures. Parker (*3*) has shown that this infectious agent survives in and can be transmitted by nymphal and adult *D. andersoni* that have ingested the virus in the larval stage and that it also survives through the eggs of infected female ticks to the larval stage. Davis and Cox (*1*) have described the infection in guinea pigs in some detail, and they have also shown that white rats, mice, and rabbits are susceptible, although they were unable to carry the infection beyond the third transfer in rabbits. No agglutinins for *Proteus* X strains were found in these rabbits. They were unable to infect monkeys (*M. rhesus*) in three attempts, two monkeys being used at each trial.

Following an incubation period, usually of from 4 to 6 days, the infection produces a definite febrile reaction in guinea pigs which lasts from 2 to 8 days. No scrotal reaction has been observed. Following subcutaneous inoculations, the guinea pigs develop a marked inflammatory thickening of the skin at the site of inoculation. Death of the guinea pigs is not infrequent. The chief post mortem finding is an enlarged spleen.

Dyer (*4*) has reported the accidental infection of a laboratory worker with the Montana infection and has suggested a relationship between this infection and "Q" fever of Australia, his suggestion being based on the fact that he found that guinea pigs which had recovered from infection with "Q" fever virus were subsequently immune to the infectious agent isolated by Davis and Cox from Montana ticks.

"Q" fever was described by Derrick (*5*) in 1937 as an acute illness with a febrile period of from 7 to 24 days. The first cases were noted by Derrick in 1935. Headache is a prominent symptom, other complaints being malaise, anorexia, and pain in back and limbs. A rash is not a feature of the disease, being present in only one of the first

[1] From the Division of Infectious Diseases, National Institute of Health.

nine cases described. Blood counts have been essentially normal, blood cultures negative, and no production of agglutinins for *Proteus* X19 or K, undulant fever, typhoid and paratyphoid fever, or leptospirosis has been found.

The Australian cases have so far been found chiefly among workers in abattoirs and among dairy farmers.

Burnet and Freeman (*6*) described a rickettsia in the spleens of mice infected with "Q" fever. This rickettsia has been named *Rickettsia burneti* by Derrick (*7*). Burnet (*8*) points out that this rickettsia differs from other recognized rickettsiae in that it fails to produce agglutinins for either *Proteus* X19 or XK in man or animals, and as yet no arthropod vector has been found. There is also some question in regard to its filterability, since Burnet found that it was filterable to some extent through gradacol type membranes of 0.7μ average pore diameter. This rickettsia, like other recognized rickettsiae, grows readily in tissue cultures but not on ordinary media.

The Australian workers have found monkeys (*Macacus rhesus*), guinea pigs, white mice, and several native rodents susceptible (*12*). They reported in their early publications that they had not succeeded in infecting rabbits. Apparently they have more recently found this rodent susceptible. Various wild animals have also been found susceptible, particularly the bandicoot (*Isoodon macrourus*), a marsupial, and some evidence has been presented that this animal may act as a reservoir in nature (*9*). They report failure in their attempts to infect two species of mites and one species of fleas. They have not published reports of trials with ticks, but Derrick in a personal communication states that he has apparently been able to infect one species of tick.

In their identification of "Q" fever in man and animals the Australian workers (*10, 11*) rely largely on the agglutination of rickettsia suspensions prepared from mouse spleens and upon cross immunity tests. The titers of the agglutinating sera are low, one series of 4 human laboratory infections yielding titers of 1:10, with one additional case showing a titer of 1:100. They have failed to find agglutinins for *Rickettsia burneti* in Rocky Mountain spotted fever sera, and in a typhus serum which agglutinated *Proteus* X19 at 1:1280. Cross immunity (guinea pig tests) has been found lacking between "Q" fever and leptospirosis, rat-bite fever, and caseous lymphadenitis of sheep. In addition, Rocky Mountain spotted fever vaccine does not protect against "Q" fever.

Derrick reports that in guinea pigs "Q" fever produces a definite febrile reaction of from 4 to 6 days duration following an incubation period of 2 to 18 days. Some guinea pigs have fever lasting only one day, while inapparent infections have been noted. Scrotal reactions have not been observed and the mortality is nil. The chief post-

mortem finding is an enlarged spleen. No particular local reaction was found at the site of subcutaneous inoculations.

The infection isolated by Davis and Cox from Montana ticks was contracted by a member of the staff of the National Institute of Health in May 1938. The course of this illness was similar to that described for "Q" fever, except that headache was absent. During illness the infection was recovered from the patient's blood and was established in guinea pigs. On the recovery of the patient it was shown that his blood contained neutralizing antibodies when tested against the virus previously recovered from the blood. This definitely indicated that the infection in the guinea pigs and that in the patient was the same. This strain of the Montana infection has been referred to in a previous publication (*4*) as the X strain and the same designation will be used in this paper. Further study of this strain in comparison with the original strain isolated in Montana and maintained in guinea pigs has shown that these two strains are identical.

At the time this study was in progress at the National Institute of Health, a strain of "Q" fever supplied by Dr. Burnet was also being carried in guinea pigs. In the course of these studies 5 guinea pigs which had recovered from "Q" fever were inoculated with the X strain and found to be immune. Unfortunately, about this time the "Q" fever strain was lost through secondary infection in the guinea pigs. Dr. Burnet again sent his "Q" fever strain to this laboratory in the form of two infected mouse spleens, and the strain was again established in mice and guinea pigs and has been maintained for approximately 4 months. This "Q" fever strain has, in this laboratory, never given quite as definite reactions in guinea pigs as those described by the Australian workers. The incubation period has been somewhat longer, the fever of shorter duration, and the spleen, although enlarged, has not been found enlarged to the extent indicated by the Australian reports. Rickettsiae have been observed in smears from the cut surface of the spleens of mice, but they have never been numerous. We have been of the impression that the infection in guinea pigs, although definite, is not as marked as that described by the Australian investigators. It is thought that this strain may have lost virulence during its storage en route from Melbourne, the total time of storage for one mouse spleen being 63 days, and for the other, 47 days.

CROSS IMMUNITY TESTS

A series of cross immunity tests have been made between the "Q" fever strain, the X strain of the Montana infection, two strains of typhus fever, one (W) an endemic strain, the other (B) an epidemic strain, and two strains of Rocky Mountain spotted fever, one (BR) a virulent strain isolated in Montana, the other (K) a milder strain iso-

lated from a patient who contracted his infection in Maryland. Complete cross immunity exists between the two strains of typhus and between the two strains of spotted fever, while it is lacking between the typhus strains and the spotted fever strains.

Figures 1 to 5 [2] show cross immunity tests of the "Q" and X strains. It will be seen that there is no cross immunity between the X strain and the typhus and spotted fever strains and none between the "Q"

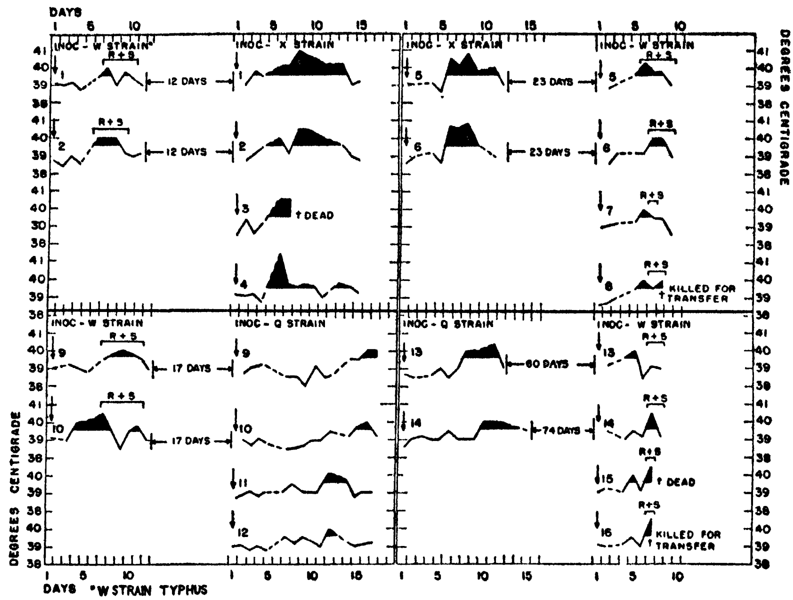

FIGURE 1.

fever and spotted fever strains. There is a suggestion of some degree of immunity produced by the typhus strains against the "Q" fever strain but the reverse of this is not true. There is complete cross immunity between the X strain and the "Q" fever strain.

AGGLUTINATION TESTS

Dr. Burnet kindly supplied us with a suspension of rickettsia prepared by him. This suspension was tested by Dr. Topping, of the National Institute of Health staff, against the serum from case X drawn after recovery from infection with the Montana virus, and against control specimens of sera from a recovered case of "Q" fever, supplied by Dr. Derrick, an immune rabbit serum from Australia, and sera from two men at the National Institute of Health. One of

[2] In these figures, the temperature records of guinea pigs are shown. Arrows pointing down indicate the day of inoculation. Guinea pig identification number is given above each temperature curve. In each test guinea pigs were inoculated intraperitoneally with the strain shown on the chart. After recovery following this inoculation these guinea pigs and additional guinea pigs were inoculated with the strain indicated. "R+S"=Scrotal redness and swelling typical for the strain used.

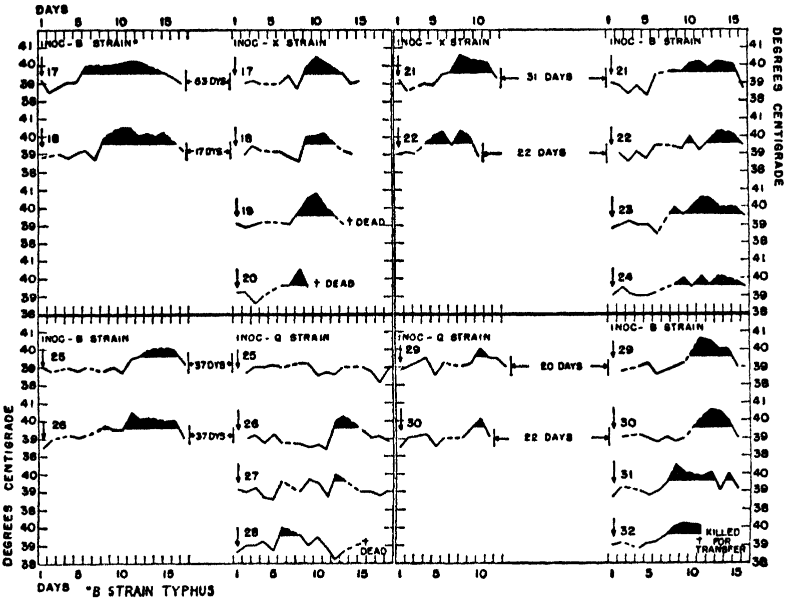

FIGURE 2.

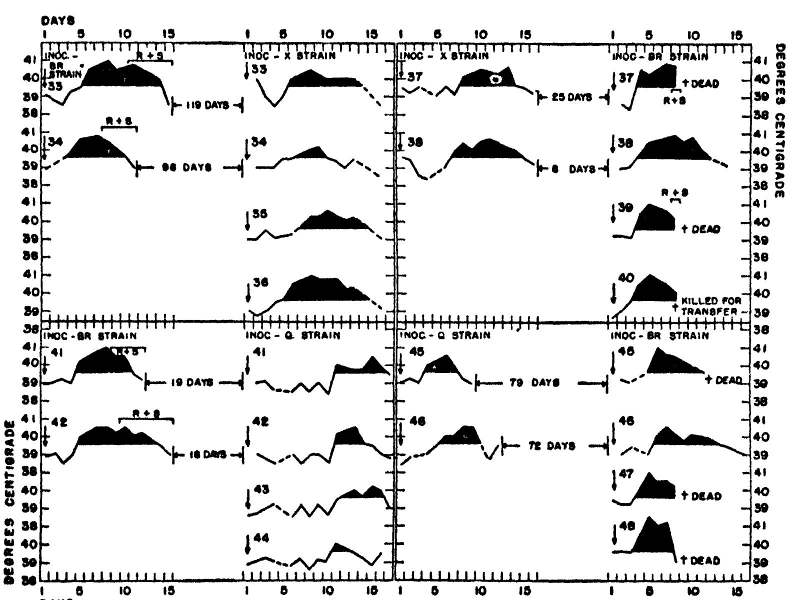

FIGURE 3.

the men had had typhus fever and had been repeatedly vaccinated against spotted fever. The second had had no previous rickettsial infection. The rabbit serum contained no agglutinins for X19 or X2. An additional human serum from a suspected but unproven case of

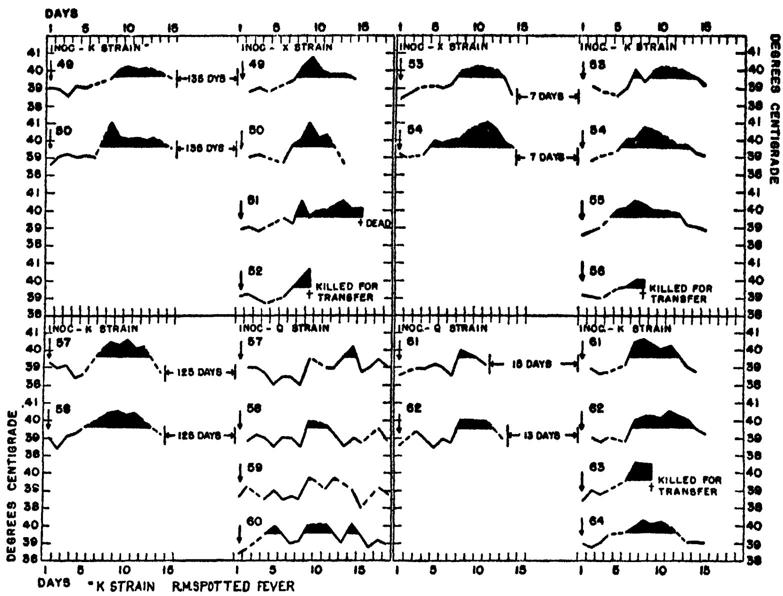

FIGURE 4.

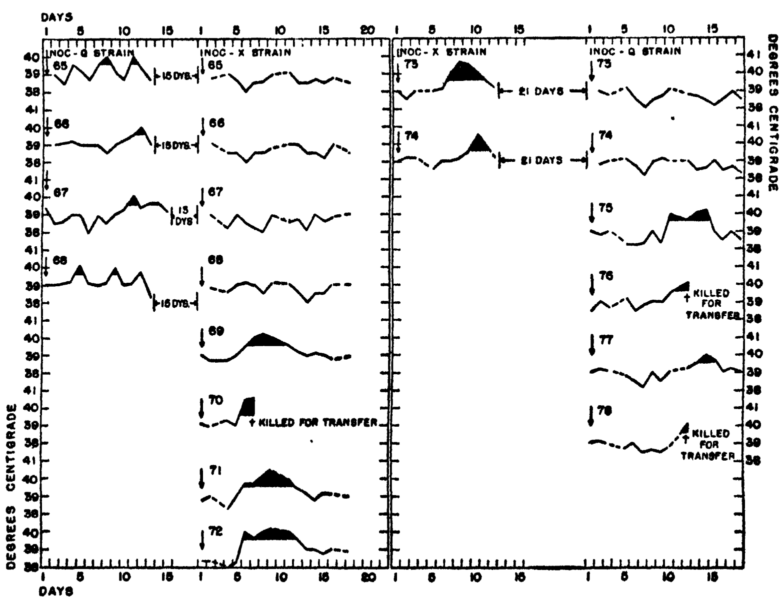

FIGURE 5.

infection with the same Montana infection suffered by X was also tested.

The results of this agglutination test are shown in table 1.

It should be noted that the Australian authors consider agglutinations in dilutions as low as 1:5 and 1:10 as significant.

TABLE 1.—*Agglutination of* Rickettsia burneti [1] *by certain sera*

Serum	Serum dilution					
	1:5	1:10	1:20	1:40	1:80	1:160
X	[2] 3	2	2	1	0	0
Kn	0	0	0	0	0	0
Hi	0	0	0	0	0	0
Co	2	0	0	0	0	0
Q	3	2	0	0	0	0
Rabbit	4	4	4	8	3	2

[1] Rickettsia suspension prepared by Dr. Burnet (Australia).
[2] 4=complete; 3=incomplete; 2=partial; 1=trace.
Serum identification.
X.—Serum from Case X. Previous history: Typhus fever, vaccinated against Rocky Mountain spotted fever, infected with the infectious agent from Montana ticks.
Kn.—Previous history. Typhus, vaccinated against Rocky Mountain spotted fever.
Hi.—No previous rickettsial infection nor vaccination
Co.—Vaccinated against Rocky Mountain spotted fever. Possible previous infection with the infectious agent from Montana ticks.
Q.—Australian case of "Q" fever.
Rabbit.—Infected with "Q" fever in Australia.

PROTECTION TESTS

Protection tests have been made using various human sera and the X strain of virus. In these tests, 0.5-cc. amounts of the serum being

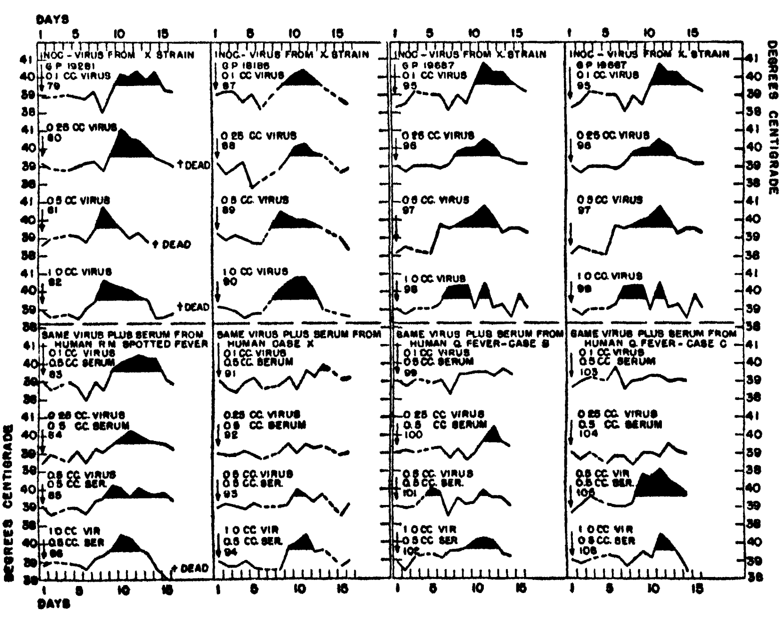

FIGURE 6.

tested were mixed in conical vials with different amounts of blood serum drawn from a guinea pig at the height of its infection. The amounts of this guinea pig blood serum virus (X strain) were 0.1, 0.25, 0.5, and 1.0 cc. The mixtures were allowed to stand at room temperature for 30 minutes and then injected intraperitoneally into

guinea pigs. Control guinea pigs were inoculated with like amounts of the same blood serum virus.

The sera used were from the following cases:

One case of Rocky Mountain spotted fever. This serum gave complete protection against spotted fever.

One sample from Case X from which virus X was recovered.

Two sera supplied by Dr. Derrick from human cases of "Q" fever.

The results of these protection tests are shown in figure 6. It will be seen from this figure that definite protection against X virus was afforded by the X serum and the "Q" fever sera while the control spotted fever serum showed no protection.

SUMMARY

The points of similarity and dissimilarity between the Montana infection and the "Q" fever of Australia may be summarized as follows:

Epidemiology.—"Q" fever has been recognized principally in persons associated with animals, which suggests infection from direct contact with infected animal tissues or with animal parasites.

The epidemiology of the Montana infection is unknown, but the presence of the virus in ticks suggests that human infections may be found in rural areas.

Clinical.—The one recognized human infection with the Montana virus was very similar to the published descriptions of the Australian "Q" fever cases.

Susceptibility of animals.—As far as work has been carried out, the only point of difference in susceptibility of animals to the two infections is the failure of the American workers to find the monkey susceptible, in contrast to the success in infecting this animal in Australia.

The susceptibility of rabbits has not been studied thoroughly enough to warrant definite statement.

Serology in man and animals.—Neither disease has been found to produce agglutinins for *Proteus* X strains. It should not be forgotten that the opportunity to study this point in human beings in this country has been limited to one case.

Reactions in guinea pigs.—The clinical pictures in guinea pigs, as described in the literature, are similar, with the exception that the Montana infection has been reported to produce a definite local skin reaction following subcutaneous inoculation, while the Australian workers state that no particular local reaction follows subcutaneous inoculation. A comparison of the two strains in this laboratory shows that the "Q" fever strain produces general reactions in guinea pigs which, although similar to those produced by the Montana virus, are milder. This fact may be explained by the attenuation of the "Q" virus during transit to this country. Rickettsiae have not been ob-

served in guinea pigs with "Q" fever, while they are present in abundance in guinea pigs infected with the Montana virus.

Cross immunity tests.—These tests are identical, with the exception that epidemic typhus, and, to a lesser extent, endemic typhus apparently produce more immunity to "Q" fever than to the Montana virus.

Agglutination of rickettsia.—In one well-controlled test the serum from one recovered case of the Montana infection gave results identical with one serum from a recovered case of "Q" fever when tested with a suspension of *Rickettsia burneti* prepared in Australia.

Protection tests.—As far as these tests have been tried no immunological difference has been noted between the virus of "Q" fever and that isolated from Montana ticks.

CONCLUSION

There are many points yet remaining to be cleared up by further comparative study of the infection isolated from ticks in Montana and "Q" fever. The evidence so far submitted indicates that the two infections are closely related.

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DEATHS DURING WEEK ENDED JUNE 17, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 17, 1939	Corresponding week, 1938
Date from 88 large cities of the United States:		
Total deaths	7,601	[1] 7,684
Average for 3 prior years	[2] 7,628	
Total deaths, first 24 weeks of year	214,532	206,773
Deaths under 1 year of age	475	[1] 496
Average for 3 prior years	[2] 486	
Deaths under 1 year of age, first 24 weeks of year	12,598	12,837
Data from industrial insurance companies:		
Policies in force	67,191,608	69,250,632
Number of death claims	10,156	12,077
Death claims per 1,000 policies in force, annual rate	7 9	9.1
Death claims per 1,000 policies, first 24 weeks of year, annual rate	11.3	9.8

[1] Data for 87 cities.
[2] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 24, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934-38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934-38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934-38, median
NEW ENG.												
Maine	6	1	0	0	----	----	2	1	863	143	53	53
New Hampshire	0	0	0	0	----	----	----	----	223	22	9	9
Vermont	0	0	0	0	----	----	----	----	2,600	194	97	39
Massachusetts	1	1	1	6	----	----	----	----	836	711	521	521
Rhode Island	15	2	0	1	----	----	----	----	664	87	10	43
Connecticut	8	1	3	6	9	3	----	----	1,033	348	69	107
MID. ATL.												
New York	8	19	30	89	[1] 8	[1] 4	[1] 2	[1] 2	459	1,146	2,573	1,985
New Jersey [2]	10	8	15	8	7	6	2	2	46	39	332	647
Pennsylvania	8	15	14	37	----	----	----	----	96	189	778	1,302
E. NO. CEN.												
Ohio	3	4	10	17	6	8	----	4	22	29	419	472
Indiana [2]	6	4	6	6	1	1	----	5	13	9	80	80
Illinois	10	16	32	42	10	15	9	9	14	22	422	438
Michigan [3]	8	8	8	8	1	1	1	1	271	256	1,416	288
Wisconsin	0	0	4	4	23	13	11	15	703	400	1,614	1,432
W. NO. CEN.												
Minnesota	4	2	2	2	6	3	----	1	176	91	196	103
Iowa [2]	4	2	0	3	10	5	----	----	170	84	192	41
Missouri	9	7	12	13	----	----	9	23	10	8	27	27
North Dakota	15	2	0	0	124	17	2	1	73	10	41	31
South Dakota	0	0	0	1	8	1	----	----	338	45	----	2
Nebraska	4	1	5	5	----	----	----	----	198	52	75	30
Kansas	8	8	5	5	11	4	----	1	151	54	123	123
SO. ATL.												
Delaware	0	0	0	0	----	----	----	----	177	9	3	15
Maryland [2, 3]	8	1	3	4	15	5	1	1	244	79	81	119
Dist. of Col.	8	1	3	6	8	1	----	----	776	96	22	22
Virginia [2]	22	12	6	6	32	17	----	----	463	247	167	167
West Virginia	11	4	6	6	13	5	8	8	30	11	124	100
North Carolina [2, 4]	13	9	14	10	----	----	2	1	281	192	696	343
South Carolina [4]	14	5	4	1	295	108	46	52	22	8	48	48
Georgia [2, 4]	13	8	6	6	22	13	----	----	70	42	55	----
Florida [4]	12	4	4	5	12	4	----	----	136	45	13	7

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 24, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	3	2	10	7	10	6	4	3	10	6	63	131
Tennessee [3]	2	1	4	3	18	10	9	13	85	48	44	44
Alabama [4]	5	3	2	8	81	46	3	6	83	47	85	36
Mississippi [3]	0	0	3	5	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	5	2	1	1	22	9	4	4	27	11	60	9
Louisiana	24	10	8	12	12	5	9	9	56	23	17	9
Oklahoma	0	0	3	3	4	2	15	20	121	60	46	20
Texas [4]	7	9	25	25	42	51	130	66	144	174	67	158
MOUNTAIN												
Montana	9	1	0	0	84	9	------	------	674	72	55	21
Idaho [2]	0	0	0	0	------	------	7	1	357	35	4	5
Wyoming [3]	22	1	0	0	------	------	------	------	873	40	5	5
Colorado [3] [5]	48	10	5	3	14	3	------	------	332	69	94	94
New Mexico	62	5	2	2	------	------	1	------	86	7	12	16
Arizona	12	1	3	2	380	31	17	15	147	12	12	12
Utah [3]	0	0	4	0	------	------	------	------	804	81	252	41
PACIFIC												
Washington	0	0	1	1	------	------	------	------	2,618	849	16	178
Oregon	0	0	4	2	55	11	8	8	423	85	33	33
California	18	22	24	31	16	20	11	24	851	1,038	511	511
Total	8	207	292	364	21	437	313	371	296	7,325	11,632	11,632
25 weeks	16	9,980	11,940	12,789	281	149,068	43,332	101,981	532	329,389	730,197	634,539

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	24	4	19	13
New Hampshire	0	0	0	0	0	0	0	0	51	5	8	7
Vermont	0	0	0	0	0	0	0	0	27	2	8	8
Massachusetts	1.2	1	1	1	1.2	1	0	1	114	97	218	155
Rhode Island	0	0	0	0	0	0	0	0	46	6	11	14
Connecticut	0	0	0	0	0	0	1	0	74	25	45	45
MID. ATL.												
New York	0.8	2	4	7	0.4	1	1	3	87	217	350	350
New Jersey [3]	0	0	1	1	0	0	0	0	83	70	50	84
Pennsylvania	4	7	1	7	0.5	1	0	0	88	174	128	359
E. NO. CEN.												
Ohio	0	0	1	4	0	0	2	2	38	50	74	169
Indiana [3]	1.5	1	1	1	1.5	1	0	0	61	41	28	35
Illinois	2	3	4	4	1.3	2	1	1	114	174	173	290
Michigan [3]	1.1	1	0	2	2.1	2	0	0	220	208	309	283
Wisconsin	0	0	5	2	0	0	0	1	128	73	84	242
W. NO. CEN.												
Minnesota	1.9	1	0	0	1.9	1	0	0	37	19	48	58
Iowa [3]	2	1	0	0	0	0	0	0	47	23	22	55
Missouri	0	0	0	1	0	0	0	0	32	25	61	22
North Dakota	0	0	0	0	0	0	1	0	44	6	13	29
South Dakota	8	1	0	0	0	0	2	0	30	4	6	6
Nebraska	0	0	0	0	4	1	0	0	50	13	10	10
Kansas	0	0	1	0	0	0	0	0	92	33	25	25

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 24, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	20	1	5	3
Maryland [2,3]	6	2	2	2	0	0	0	0	28	9	45	36
Dist. of Col.	0	0	1	1	0	0	0	0	40	5	13	7
Virginia [3]	6	3	3	4	4	2	2	2	21	11	18	12
West Virginia	0	0	1	1	0	0	1	1	22	8	22	24
North Carolina [3,4]	0	0	3	3	4	3	1	1	23	16	13	13
South Carolina [4]	2.7	1	1	0	82	30	0	0	3	1	3	1
Georgia [3,4]	1.7	1	0	0	5	3	3	0	3	2	10	8
Florida [4]	0	0	0	1	3	1	1	1	30	10	3	2
E. SO. CEN.												
Kentucky	0	0	3	3	0	0	1	1	16	9	22	15
Tennessee [3]	0	0	4	2	4	2	1	1	25	14	8	8
Alabama [4]	4	2	4	2	4	2	7	5	25	14	3	3
Mississippi [3]	2.5	1	0	0	0	0	4	0	10	4	0	4
W. SO. CEN.												
Arkansas	0	0	0	0	7	3	0	0	15	6	6	6
Louisiana	0	0	0	1	0	0	4	2	12	3	5	5
Oklahoma	2	1	1	1	2	1	1	1	14	7	14	10
Texas [4]	0	0	2	2	2.5	3	0	0	12	15	64	31
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	56	6	8	13
Idaho [3]	0	0	0	0	0	0	0	0	20	2	2	2
Wyoming [3]	0	0	0	0	0	0	0	0	44	2	3	3
Colorado [3,5]	0	0	0	0	14	3	0	0	96	20	30	18
New Mexico	0	0	0	0	0	0	0	0	49	4	9	9
Arizona	0	0	0	0	74	6	1	0	12	1	2	6
Utah [3]	0	0	0	0	0	0	0	0	50	5	18	18
PACIFIC												
Washington	0	0	0	0	0	0	0	0	59	19	18	34
Oregon	0	0	0	0	0	0	0	0	30	6	24	23
California	1.6	2	0	4	11	14	2	9	88	107	110	134
Total	1.2	31	44	73	3.3	83	37	82	63	1,578	2,168	2,937
25 weeks	1.8	1,139	1,857	3,546	1.1	713	514	657	174	109,521	128,743	155,134

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	1	1	441	73	35
New Hampshire	0	0	0	0	0	0	1	0	183	18	0
Vermont	0	0	0	0	0	0	0	0	335	25	18
Massachusetts	0	0	0	0	1	1	0	2	169	144	93
Rhode Island	0	0	0	0	8	1	1	0	313	41	18
Connecticut	0	0	0	0	3	1	1	1	100	54	96
MID. ATL.											
New York	0	0	0	0	4	10	6	11	145	362	483
New Jersey [3]	0	0	0	0	2	2	6	4	325	273	231
Pennsylvania	0	0	0	0	4	7	6	12	272	536	177

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 24, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases	1934–38, median	June 24, 1939, rate	June 24, 1939, cases	June 25, 1938, cases
E. NO. CEN.											
Ohio	5	6	0	0	3	4	4	10	84	109	100
Indiana [2]	15	10	29	1	9	6	10	3	111	75	15
Illinois	3	5	8	8	1	2	9	9	203	310	224
Michigan [3]	2	2	2	0	1	1	4	4	171	162	325
Wisconsin	0	0	4	4	2	1	0	3	341	194	206
W. NO. CEN.											
Minnesota	16	8	7	7	0	0	1	1	31	16	44
Iowa [2]	6	3	19	17	4	2	3	1	38	19	14
Missouri	3	2	53	2	8	6	6	9	36	28	37
North Dakota	0	0	1	1	0	0	0	1	66	9	14
South Dakota	0	0	7	7	0	0	1	0	8	1	3
Nebraska	19	5	0	8	0	0	0	0	95	25	1
Kansas	3	1	9	4	8	3	2	3	101	36	167
SO. ATL.											
Delaware	0	0	0	0	0	0	0	0	177	9	12
Maryland [2] [3]	0	0	0	0	0	0	3	4	197	64	56
Dist. of Col	0	0	0	0	0	0	0	0	437	54	8
Virginia [2]	0	0	0	0	36	19	5	7	210	128	99
West Virginia	3	1	1	0	32	12	5	5	32	12	77
North Carolina [2] [4]	0	0	3	1	16	11	33	13	390	267	349
South Carolina [4]	0	0	0	0	30	11	32	26	197	72	79
Georgia [2] [4]	0	0	0	0	58	35	50	50	78	47	55
Florida [4]	0	0	0	0	6	2	0	1	72	24	14
E. SO. CEN.											
Kentucky	0	0	0	0	19	11	18	18	76	44	43
Tennessee [2]	14	8	1	0	18	10	24	17	120	68	44
Alabama [4]	2	1	0	0	14	8	13	17	99	56	64
Mississippi [3]	0	0	2	0	8	3	18	11	0	-------	-------
W. SO. CEN.											
Arkansas	10	4	4	0	22	9	15	15	50	20	25
Louisiana	0	0	0	0	53	22	22	21	89	37	38
Oklahoma	16	8	3	2	16	8	10	10	8	4	51
Texas [4]	0	0	8	3	20	24	42	26	73	88	246
MOUNTAIN											
Montana	9	1	1	3	19	2	0	2	131	14	26
Idaho [2]	0	0	6	4	0	0	4	1	10	1	7
Wyoming [2]	22	1	1	2	0	0	0	0	44	2	6
Colorado [2] [5]	14	3	0	1	29	6	7	1	241	50	23
New Mexico	12	1	6	0	12	1	2	4	408	33	23
Arizona	0	0	8	0	12	1	3	3	380	31	45
Utah [3]	0	0	0	0	10	1	1	1	457	46	69
PACIFIC											
Washington	0	0	17	6	56	18	1	1	43	14	65
Oregon	50	10	19	4	0	0	1	2	104	21	48
California	10	12	7	7	3	4	5	10	120	146	244
Total	4	92	225	144	11	205	376	371	156	3,862	4,117
25 weeks	13	8,164	11,750	5,398	6	3,498	3,939	3,940	158	98,028	107,601

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 24, 1939, 21 cases as follows: New Jersey, 1; Indiana, 1; Iowa, 2; Maryland, 4; Virginia, 2; North Carolina, 2; Georgia, 1; Tennessee, 2; Idaho, 1; Wyoming, 2; Colorado, 3.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended June 24, 1939, 54 cases as follows: North Carolina, 1; South Carolina, 1; Georgia, 24; Florida, 2; Alabama, 16; Texas, 10.
[5] Colorado tick fever, week ended June 24, 1939, Colorado, 5 cases.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
May 1939										
Alabama	5	14	832	361	734	20	2	19	3	22
California	7	127	237	17	13,052	8	32	766	65	46
Colorado	3	52	27		1,452		0	192	18	7
Florida	2	10	134	33	549	50	11	30	0	26
Georgia	0	32	618	165	460	55	11	39	3	23
Illinois	5	108	197	15	191	1	5	1,723	52	17
Kansas	2	17	17	2	355	1	2	224	39	4
Louisiana	5	41	53	82	401	8	3	45	2	48
Massachusetts	8	22			4,913		0	735	0	3
Montana	1	11	148		751		1	63	6	4
Nevada	0	0	9		272		0	1	0	0
Ohio	6	68	159		220		2	1,538	76	40
Oklahoma	2	23	316	155	1,010	27	1	82	137	27
Rhode Island	2	4			577		0	48	0	5
South Dakota	0	3	50		1,459		1	68	89	0
Utah	0	2	46		483		0	99	1	5
Washington	1	10	17		4,898		0	166	13	9

May 1939

	Cases
Actinomycosis:	
Utah	1
Anthrax:	
California	1
Beriberi.	
California	1
Chickenpox:	
Alabama	95
California	3,367
Colorado	342
Florida	99
Georgia	183
Illinois	1,937
Kansas	425
Louisiana	63
Massachusetts	741
Montana	153
Ohio	1,603
Oklahoma	69
Rhode Island	125
South Dakota	42
Utah	288
Washington	770
Colorado tick fever.	
Colorado	36
Conjunctivitis, infectious:	
Georgia	3
Utah	2
Dengue.	
Florida	1
Diarrhea (enteritis included):	
Ohio (under 2 years)	20
Washington (under 2 years)	1
Washington (over 2 years)	8
Dysentery:	
California (amoebic)	13
California (bacillary)	41
Colorado (amoebic)	1
Florida (amoebic)	2
Florida (bacillary)	1
Georgia (amoebic)	6
Georgia (bacillary)	45
Illinois (amoebic)	4
Illinois (amoebic carriers)	20
Illinois (bacillary)	14
Louisiana (amoebic)	5

May 1939—Continued

	Cases
Dysentery—Continued.	
Louisiana (bacillary)	1
Massachusetts (bacillary)	5
Ohio (bacillary)	3
Oklahoma (bacillary)	13
Utah (amoebic)	2
Encephalitis, epidemic or lethargic	
Alabama	1
California	1
Colorado	2
Illinois	2
Kansas	5
Louisiana	1
Massachusetts	3
Ohio	1
Oklahoma	2
Washington	1
Food poisoning:	
California	65
Kansas	5
German measles:	
Alabama	11
California	175
Illinois	52
Massachusetts	90
Ohio	18
Rhode Island	11
Utah	18
Washington	23
Granuloma, coccidioidal:	
California	4
Hookworm disease:	
Florida	341
Georgia	1,056
Louisiana	164
Impetigo contagiosa:	
Illinois	2
Kansas	9
Montana	5
Ohio	29
Rhode Island	1
Jaundice, infectious:	
California	9
Lead poisoning:	
Ohio	7
Leprosy:	
Louisiana	1

May 1939—Continued

	Cases
Mumps:	
Alabama	192
California	3,614
Colorado	27
Florida	67
Georgia	169
Illinois	753
Kansas	868
Louisiana	6
Massachusetts	679
Montana	58
Nevada	18
Ohio	2,384
Oklahoma	32
Rhode Island	334
South Dakota	39
Utah	895
Washington	222
Ophthalmia neonatorum:	
California	1
Illinois	1
Louisiana	1
Massachusetts	64
Puerperal septicemia:	
Ohio	2
Rabies in animals:	
Alabama	21
California	88
Florida	1
Illinois	29
Louisiana	8
Oklahoma	23
Washington	46
Rabies in man:	
Kansas	2
Rocky Mountain spotted fever:	
Colorado	9
Illinois	2
Montana	10
Nevada	4
Utah	9
Washington	4
Scabies:	
Kansas	5
Montana	2
Septic sore throat:	
California	8
Colorado	8
Florida	7

Summary of monthly reports from States—Continued

May 1939—Continued	Cases
Septic sore throat—Con.	
Georgia	70
Illinois	9
Kansas	18
Louisiana	1
Massachusetts	25
Montana	5
Ohio	13
Oklahoma	95
Rhode Island	17
South Dakota	4
Washington	6
Tetanus:	
Alabama	1
California	8
Florida	1
Georgia	2
Illinois	9
Louisiana	3
Massachusetts	2
Ohio	1
South Dakota	1
Trachoma:	
California	10
Illinois	31
Ohio	3
Oklahoma	5
Trichinosis:	
California	3

May 1939—Continued	Cases
Trichinosis—Con.	
Illinois	1
Massachusetts	1
Tularaemia:	
Alabama	8
Colorado	1
Georgia	12
Illinois	4
Louisiana	1
Oklahoma	1
Utah	7
Washington	1
Typhus fever:	
Alabama	31
California	1
Florida	11
Georgia	66
Louisiana	5
Undulant fever:	
Alabama	4
California	19
Colorado	4
Florida	1
Georgia	16
Illinois	22
Kansas	3
Louisiana	5
Massachusetts	4
Montana	1

May 1939—Continued	Cases
Undulant fever—Con.	
Ohio	8
Oklahoma	115
Utah	5
Vincent's infection:	
Florida	10
Illinois	20
Kansas	9
Montana	1
Oklahoma	11
Washington	1
Whooping cough:	
Alabama	220
California	1,093
Colorado	271
Florida	200
Georgia	219
Illinois	1,001
Kansas	131
Louisiana	90
Massachusetts	635
Montana	76
Nevada	4
Ohio	805
Oklahoma	55
Rhode Island	356
South Dakota	20
Utah	306
Washington	92

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

IN A RABBIT AND IN FLEAS FROM GROUND SQUIRRELS IN LINCOLN COUNTY, WASH.

Under date of June 19, 1939, Senior Surgeon C. R. Eskey reported plague infection proved in a pool of 45 fleas from 16 ground squirrels, *C. townsendi*, shot 6 miles north of Odessa, Lincoln County, Wash., on May 25, and in tissue from 1 cottontail rabbit and a pool of 44 fleas from 21 *C. townsendi* taken May 27, at a location 8 miles northwest of Odessa. This is stated to be the first demonstration of plague infection in a rabbit in nature.

IN FLEAS FROM GROUND SQUIRRELS IN VENTURA COUNTY, CALIF.

Under date of June 23, 1939, Dr. W. M. Dickie, State Director of Public Health of California, reported plague infection proved in a pool of 151 fleas from 10 ground squirrels, *C. beecheyi*, submitted to the laboratory on June 8 from an estate 5 miles northwest of Ventura, in Mills Canyon, Ventura County, Calif.

TULARAEMIA FROM MUSKRAT BITE REPORTED IN NEW YORK STATE

A definite case of tularaemia, clinically typical of the ulceroglandular type, in which the patient's blood serum gave an agglutination reaction with *B. tularense* in a dilution of 1:2,560, was reported in a resident of Oswego County, N. Y., according to Health News for June 19, 1939, issued by the New York State Department of Health. The patient, a trapper, gave a history of having been bitten by a muskrat on April 10, 1939, and developed first symptoms on April 13.

This case is of interest in that it is the first time that a case of tularaemia resulting from the bite of a muskrat has been recognized in New York State. In investigating this case it was learned that a second trapper had had sores on his arms and hands during the past trapping season as well as at intervals during the past 10 years of his trapping experience. A sample of blood was obtained from the second trapper, and the serum agglutinated *B. tularense* in a dilution of 1:40.

In a report by Francis [1] on 6,000 cases of tularaemia reported in the United States through 1935, only 2 cases were attributed to contact with the muskrat.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 17, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	140	48	21	4,120	420	1,318	13	388	44	1,016	-------
Current week	67	49	14	2,571	228	676	8	327	38	1,082	-------
Maine:											
Portland	0	------	0	1	0	0	0	0	0	16	20
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	14
Manchester	0	------	1	0	1	0	0	0	0	0	15
Nashua	0	------	0	1	0	1	0	0	0	0	5
Vermont:											
Barre	0	------	0	0	1	0	0	0	0	9	3
Burlington	0	------	0	14	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	6
Massachusetts:											
Boston	1	------	0	184	15	38	0	7	2	26	180
Fall River	0	------	0	1	0	0	0	2	0	0	37
Springfield	0	------	0	7	0	1	0	0	1	2	27
Worcester	0	------	0	30	1	10	0	1	0	7	35
Rhode Island:											
Pawtucket	0	------	0	11	0	0	0	0	2	1	16
Providence	1	14	0	68	2	2	0	1	0	37	70
Connecticut:											
Bridgeport	0	------	0	3	1	1	0	1	0	0	40
Hartford	0	------	1	7	1	4	0	0	0	8	42
New Haven	0	------	0	143	0	2	0	1	0	7	36
New York:											
Buffalo	0	------	0	81	5	19	0	6	0	13	103
New York	13	6	2	162	49	101	0	66	5	92	1,390
Rochester	0	2	0	83	1	10	0	0	0	6	58
Syracuse	0	------	0	126	1	10	1	2	1	21	47
New Jersey:											
Camden	2	------	0	0	1	2	0	0	0	4	30
Newark	1	------	0	2	4	20	0	1	0	51	76
Trenton	0	------	0	0	2	3	0	0	0	1	39
Pennsylvania:											
Philadelphia	2	------	0	34	15	21	0	21	2	117	408
Pittsburgh	2	1	0	0	2	22	0	4	0	41	134
Reading	0	------	0	3	1	0	0	2	0	2	27
Scranton	0	------	-------	0	-------	7	0	-------	0	1	-------
Ohio:											
Cincinnati	2	------	0	0	4	3	0	6	0	3	131
Cleveland	3	2	0	4	9	33	0	10	0	53	178
Columbus	2	1	1	4	0	2	0	2	0	7	84
Toledo	0	------	0	42	2	7	0	2	0	34	52

[1] Francis, Edward: Sources of infection and seasonal incidence of tularaemia in man. Pub. Health Rep., 52: 103 (January 22, 1937).

City reports for week ended June 17, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	2	7
Fort Wayne	0	------	0	0	0	4	0	1	0	0	30
Indianapolis	2	------	0	0	5	9	0	6	0	23	99
Muncie	0	------	0	0	0	0	0	0	0	0	8
South Bend	0	------	0	0	2	0	0	1	0	9	13
Terre Haute	0	------	0	0	1	0	0	1	2	0	11
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	8
Chicago	9	8	1	12	13	118	0	52	1	74	622
Elgin	0	------	0	0	0	0	0	0	0	1	6
Moline	0	------	0	0	0	1	0	0	0	1	5
Springfield	0	------	0	0	0	0	0	0	0	6	27
Michigan:											
Detroit	2	------	0	49	4	66	0	16	0	67	210
Flint	1	------	0	25	1	5	0	0	0	0	15
Grand Rapids	0	------	0	2	0	17	0	0	0	0	24
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	4	11
Madison	0	------	0	55	1	2	0	0	0	11	16
Milwaukee	0	1	1	2	8	16	0	3	0	23	92
Racine	0	------	0	1	0	2	0	0	0	2	12
Superior	0	------	0	12	0	0	0	0	0	0	6
Minnesota:											
Duluth	0	------	0	2	0	0	0	0	0	0	25
Minneapolis	0	------	0	22	2	8	0	0	0	14	87
St. Paul	0	------	0	10	0	1	0	1	0	12	59
Iowa:											
Cedar Rapids	0	------	--------	3	-------	0	0	-------	0	3	--------
Davenport	0	------	--------	0	-------	2	1	-------	0	1	--------
Des Moines	0	------	0	4	0	6	4	0	0	0	28
Sioux City	0	------	--------	1	-------	0	0	-----	0	6	--------
Waterloo	1	------	--------	2	-------	1	0	-------	0	0	--------
Missouri:											
Kansas City	0	------	1	1	2	5	0	2	0	3	86
St. Joseph	0	------	0	0	0	1	0	0	0	2	23
St. Louis	1	------	1	2	2	15	0	3	1	21	161
North Dakota:											
Fargo	0	------	0	2	0	0	0	0	0	0	7
Grand Forks	0	------	--------	0	-------	0	0	-------	0	0	--------
Minot	0	------	0	1	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0	------	--------	5	-------	0	4	-------	0	0	--------
Nebraska:											
Lincoln	0	------	--------	9	-------	0	0	-------	0	28	--------
Omaha	0	------	0	6	2	0	0	2	0	0	47
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	4
Topeka	0	------	0	2	0	8	4	0	0	2	18
Wichita	1	------	0	16	2	1	0	0	0	1	21
Delaware:											
Wilmington	0	------	0	4	0	4	0	1	0	4	2
Maryland:											
Baltimore	2	2	1	45	8	3	0	10	0	38	189
Cumberland	0	------	0	0	1	0	0	1	0	0	9
Frederick	0	------	0	0	1	0	0	0	0	0	2
Dist. of Columbia:											
Washington	0	------	0	144	2	4	0	6	3	30	165
Virginia:											
Lynchburg	0	------	0	25	0	2	0	0	0	47	4
Norfolk	0	------	0	0	3	1	0	1	0	2	20
Richmond	1	------	0	105	3	3	0	1	0	0	50
Roanoke	0	------	0	3	0	0	0	0	0	5	9
West Virginia:											
Charleston	0	------	0	0	3	0	0	0	1	0	30
Huntington	0	------	--------	0	-------	0	0	-------	0	0	--------
Wheeling	0	------	--------	1	-------	1	0	-------	1	5	--------
North Carolina:											
Gastonia	0	------	--------	1	-------	0	0	-------	0	0	--------
Raleigh	1	------	0	0	2	0	0	0	0	8	15
Wilmington	0	------	0	1	1	0	0	0	0	2	10
Winston-Salem	0	------	0	0	0	0	0	3	1	2	19

City reports for week ended June 17, 1939—Continued

State and city	Diphtheria cases	Influenza: Cases	Influenza: Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
South Carolina:											
Charleston	0	1	0	0	1	0	0	1	0	0	20
Florence	0	------	0	0	0	0	0	0	0	0	14
Greenville	0	------	0	0	2	0	0	0	0	2	13
Georgia:											
Atlanta	1	7	0	3	2	3	0	5	2	2	70
Brunswick	0	------	0	3	1	0	0	0	0	2	5
Savannah	0	1	0	0	0	0	0	3	1	3	40
Florida:											
Miami	0	------	0	0	2	1	0	5	0	6	44
Tampa	0	1	1	28	0	1	0	0	0	0	22
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	6
Covington	0	------	0	0	0	0	0	3	0	0	10
Lexington	0	------	0	0	0	0	0	0	0	0	19
Louisville	0	------	0	4	4	6	0	4	0	5	71
Tennessee:											
Knoxville	0	------	1	4	1	3	0	1	0	0	29
Memphis	0	------	1	1	0	0	0	4	2	36	67
Nashville	0	------	0	2	0	1	0	0	0	1	47
Alabama:											
Birmingham	0	1	1	0	1	2	0	3	0	4	60
Mobile	0	------	0	2	0	0	0	0	1	0	12
Montgomery	0	------	--------	0	-------	0	0	-------	0	0	--------
Arkansas:											
Fort Smith	0	------	--------	1	-------	0	0	-------	0	0	--------
Little Rock	0	------	0	0	2	0	0	2	0	0	4
Louisiana:											
Lake Charles	0	------	0	1	0	0	0	0	0	0	5
New Orleans	4	------	0	0	13	4	0	10	5	0	123
Shreveport	0	------	0	1	3	1	0	4	0	0	60
Oklahoma:											
Oklahoma City	0	------	0	8	1	1	0	1	0	0	52
Tulsa	6	------	--------	0	-------	2	-------	-------	0	0	--------
Texas:											
Dallas	2	------	0	9	4	3	0	3	0	1	56
Fort Worth	0	------	0	3	3	2	0	1	1	1	31
Galveston	0	------	0	1	2	0	0	2	0	0	13
Houston	3	------	0	7	4	0	0	3	1	1	68
San Antonio	0	------	0	1	0	1	0	13	1	0	72
Montana:											
Billings	0	------	0	1	1	0	0	0	0	0	9
Great Falls	0	------	0	50	0	1	0	0	0	0	7
Helena	0	------	0	1	0	0	0	0	0	0	1
Missoula	0	------	0	6	0	0	0	0	0	0	11
Idaho:											
Boise	0		0	0	1	0	0	0	0	1	5
Colorado:											
Colorado Springs	0	------	0	2	0	0	0	2	0	0	16
Denver	1	------	1	13	3	4	0	3	0	15	75
Pueblo	0	------	0	17	1	1	0	1	0	24	4
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	3	11
Utah:											
Salt Lake City	0	------	0	11	1	7	0	1	0	21	31
Washington:											
Seattle	0	------	0	357	4	3	0	1	0	3	88
Spokane	0	------	0	46	2	6	0	0	0	1	23
Tacoma	0	------	0	4	0	1	0	1	1	0	23
Oregon:											
Portland	0	2	0	6	3	7	0	3	0	0	84
Salem	0	4	--------	1	-------	0	0	-------	0	0	--------
California:											
Los Angeles	4	5	0	258	6	26	0	20	3	22	297
Sacramento	2	------	0	42	4	3	3	1	0	2	27
San Francisco	1	1	1	6	2	11	0	3	0	16	133

City reports for week ended June 17, 1939—Continued

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
Massachusetts:			
Worcester	0	1	0
New York:			
New York	2	0	1
Pennsylvania:			
Philadelphia	1	0	0
Scranton	0	0	1
Ohio:			
Cleveland	1	0	0
Indiana:			
South Bend	0	0	1
Nebraska:			
Omaha	1	0	0
North Carolina:			
Winston-Salem	0	1	0
South Carolina:			
Charleston	0	0	10
Greenville	0	1	0
Georgia:			
Savannah	0	0	1
Tennessee:			
Memphis	1	0	0
California:			
Los Angeles	0	0	1

Encephalitis, epidemic or lethargic.—Cases: Sacramento, 1.

Pellagra.—Cases: Philadelphia, 1; Columbus, 1; Baltimore, 1; Lynchburg, 2; Charleston, S. C., 3; Atlanta, 2; Savannah, 2; Louisville, 1; San Francisco, 1.

Typhus fever.—Cases: New York, 2; Charleston, S. C., 1; Atlanta, 2; Miami, 2; Mobile, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended June 3, 1939.—During the week ended June 3, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1						1
Chickenpox		9	12	131	166	29	11	13	69	440
Diphtheria		3	2	38	3	6	3			54
Dysentery				6	1					7
Influenza		69			6				26	101
Measles		15		961	936	18		27	11	1,968
Mumps	4	7		56	73	27		6	2	175
Pneumonia	1	13			16				6	36
Poliomyelitis					1					1
Scarlet fever		5	16	61	122	4	4	14	11	237
Tuberculosis	5	22	85	87	61	51		3		264
Typhoid and paratyphoid fever				15	5		1		1	22
Whooping cough	2	81		72	96	12	26	3	30	322

Vital statistics—Fourth quarter 1938 and year 1938.—The Bureau of Statistics of the Dominion of Canada has published the following preliminary statistics for the fourth quarter of 1938. The rates are computed on an annual basis. There were 19.0 live births per 1,000 population during the fourth quarter of 1938 as compared with 18.3 per 1,000 population during the fourth quarter of 1937. The death rate was 9.3 per 1,000 population for the fourth quarter of 1938 and 9.8 per 1,000 population for the corresponding quarter of 1937. The infant mortality rate for the fourth quarter of 1938 was 63 per 1,000 live births and 72 per 1,000 live births for the fourth quarter of 1937. The maternal death rate was 3.8 per 1,000 live births for the fourth quarter of 1938 and 4.4 per 1,000 live births for the same quarter of 1937.

The accompanying tables give the numbers of births, deaths, and marriages, by Provinces, for the fourth quarter of 1938 and the year 1938, and deaths by causes in Canada for the fourth quarter of 1938 and the corresponding quarter of 1937, and for the years 1938 and 1937.

Number of births, deaths, and marriages, fourth quarter 1938

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	53, 542	26, 228	3, 374	205	25, 389
Prince Edward Island	452	256	27	------------	217
Nova Scotia	2, 549	1, 216	172	7	1, 136
New Brunswick	2, 624	1, 211	203	11	914
Quebec	18, 357	7, 795	1, 429	85	5, 885
Ontario	15, 484	9, 223	779	58	8, 051
Manitoba	3, 205	1, 530	186	5	2, 062
Saskatchewan	4, 158	1, 542	238	16	2, 701
Alberta	3, 809	1, 471	202	16	2, 636
British Columbia	2, 904	1, 984	138	7	1, 787

[1] Exclusive of Yukon and the Northwest Territories.

Deaths by cause, fourth quarter, 1938

Cause of death	Canada [1] (fourth quarter)		Province								
	1937	1938	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	458	499	4	24	17	168	198	19	12	25	32
Cancer	3, 051	3, 032	33	146	111	798	1, 114	200	172	167	291
Cerebral hemorrhage, cerebral embolism and thrombosis	516	511	8	35	43	117	196	25	25	29	33
Diarrhea and enteritis	885	601	6	22	22	296	116	41	51	34	13
Diphtheria	158	143	------	8	16	95	2	7	8	6	1
Diseases of the arteries	2, 417	2, 526	34	115	96	459	1, 189	167	139	127	200
Diseases of the heart	4, 361	4, 478	29	190	173	1, 068	1, 928	264	231	243	352
Homicides	37	19	------	------	------	6	7	1	2	------	3
Influenza	637	506	2	17	16	193	146	35	35	29	33
Measles	155	37	------	1	------	26	3	------	3	2	2
Nephritis	1, 570	1, 598	28	66	44	693	486	38	74	64	105
Pneumonia	1, 991	1, 897	18	109	149	474	647	116	115	138	131
Poliomyelitis	36	18	------	------	1	6	5	2	------	3	1
Puerperal causes	226	205	------	7	11	85	58	5	16	16	7
Scarlet fever	78	52	------	------	1	26	13	2	4	3	3
Smallpox	------	2	------	------	------	------	------	------	2	------	------
Suicides	223	213	1	9	4	22	78	21	26	20	32
Tuberculosis	1, 386	1, 382	17	70	85	603	299	74	62	56	116
Typhoid fever and paratyphoid fever	149	50	------	------	3	21	12	7	3	1	3
Violence	1, 042	1, 000	7	51	37	241	365	55	56	67	121
Other specified causes	------	7, 209	65	336	342	2, 204	2, 330	431	495	429	487
Unspecified or ill-defined causes	------	147	4	8	29	61	15	6	8	5	11
Whooping cough	201	103	------	2	11	43	16	14	3	7	7

[1] Exclusive of Yukon and the Northwest Territories.

Number of births, deaths, and marriages, year 1938

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	228, 060	106, 262	14, 431	957	88, 337
Prince Edward Island	1, 957	1, 015	112	5	591
Nova Scotia	11, 614	5, 750	719	42	4, 060
New Brunswick	11, 399	4, 864	851	52	3, 363
Quebec	77, 985	32, 586	6, 480	406	25, 036
Ontario	65, 375	36, 862	3, 244	251	30, 080
Manitoba	13, 478	5, 893	750	39	6, 262
Saskatchewan	18, 065	6, 003	915	46	5, 853
Alberta	15, 819	5, 861	811	68	6, 960
British Columbia	12, 368	7, 428	549	48	6, 132

[1] Exclusive of Yukon and the Northwest Territories.

Deaths by cause, year 1938, comparative

Cause of death	Canada[1] 1937	Canada[1] 1938	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	1,633	1,535	6	66	58	413	677	80	48	77	110
Cancer	11,963	11,980	186	652	459	3,189	4,466	774	640	680	984
Cerebral hemorrhage, cerebral embolism and thrombosis	2,005	1,999	28	181	160	431	789	81	110	102	117
Diarrhea and enteritis	4,216	2,581	17	98	107	1,344	508	161	170	116	60
Diphtheria	369	432	------	23	31	302	11	16	27	18	4
Diseases of the arteries	9,609	9,932	96	557	391	1,835	4,741	601	502	455	754
Diseases of the heart	16,840	17,298	142	821	676	4,127	7,348	961	980	895	1,348
Homicides	138	125	------	2	4	26	44	7	13	14	15
Influenza	5,260	2,350	13	132	63	951	618	137	151	174	111
Measles	837	250	1	15	7	133	31	3	19	30	11
Nephritis	6,530	6,460	81	316	187	2,881	1,899	217	267	243	369
Pneumonia	7,781	7,397	101	472	506	2,055	2,493	408	426	486	450
Poliomyelitis	200	88	------	1	4	16	25	11	7	15	4
Puerperal causes	------	957	5	42	52	406	251	39	46	68	48
Scarlet fever	269	200	------	4	2	99	48	6	12	25	4
Smallpox	2	3	------	1	------	------	------	------	2	------	------
Suicides	978	944	8	42	20	134	359	91	77	99	119
Tuberculosis	6,669	6,087	80	390	339	2,615	1,236	349	269	279	530
Typhoid fever	330	206	1	7	18	102	39	11	8	12	8
Violence	4,609	4,542	26	234	172	1,184	1,668	266	257	266	469
Other specified causes	------	29,807	262	1,633	1,441	9,879	9,462	1,626	1,922	1,747	1,835
Unspecified or ill-defined causes	------	601	17	55	146	194	61	17	32	30	49
Whooping cough	763	493	------	6	21	270	88	31	18	30	29

[1] Exclusive of Yukon and the Northwest Territories.

CUBA

Habana—Communicable diseases—4 weeks ended June 3, 1939.—During the 4 weeks ended June 3, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	4	--------	Scarlet fever	4	--------
Lethargic encephalitis	1	1	Tuberculosis	6	1
Malaria	6	--------	Typhoid fever	24	7

Provinces—Notifiable diseases—4 weeks ended May 27, 1939.—During the 4 weeks ended May 27, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	3	--------	6	1	3	15
Chickenpox	--------	3	--------	--------	--------	1	4
Diphtheria	--------	2	1	4	5	1	13
Leprosy	--------	2	1	1	--------	5	9
Lethargic encephalitis	--------	1	--------	--------	--------	--------	1
Malaria	18	9	1	15	7	21	71
Measles	--------	--------	--------	1	--------	4	5
Scarlet fever	--------	8	--------	--------	--------	1	9
Tuberculosis	29	42	26	49	25	44	215
Typhoid fever	21	48	6	28	7	26	136
Whooping cough	--------	--------	--------	2	--------	--------	2

IRISH FREE STATE

Vital statistics—Quarter ended March 31, 1939.—The following vital statistics for the Irish Free State for the quarter ended March 31, 1939, are taken from the Quarterly Return of Marriages, Births, and Deaths, issued by the Registrar General and are provisional:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	3,485	4.7	Deaths from—Continued		
Births	14,207	19.4	Influenza	685	0.9
Total deaths	13,318	18.2	Measles	20	
Deaths under 1 year of age	1,158	[1] 82	Puerperal sepsis	8	[1] 6
Deaths from:			Scarlet fever	16	
Cancer	910	1.2	Tuberculosis (all forms)	882	1.2
Diarrhea and enteritis (under 2 years)	146		Typhoid fever	13	
Diphtheria	86		Whooping cough	66	

[1] Per 1,000 live births.

ITALY

Communicable diseases—4 weeks ended March 26, 1939.—During the 4 weeks ended March 26, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	Feb 27-Mar. 5	Mar. 6-12	Mar 13-19	Mar 20-26
Anthrax	7	4	5	7
Cerebrospinal meningitis	46	41	42	39
Chickenpox	413	387	443	383
Diphtheria	552	520	544	480
Dysentery (amoebic)	14	17	25	12
Dysentery (bacillary)	2			1
Hookworm disease	26	16	18	27
Lethargic encephalitis	4	3	1	2
Measles	1,423	1,499	1,445	1,468
Mumps	280	233	285	287
Paratyphoid fever	37	41	29	28
Pellagra	4	1		7
Poliomyelitis	20	27	29	20
Puerperal fever	35	40	36	23
Scarlet fever	229	221	213	263
Typhoid fever	372	321	300	232
Undulant fever	96	93	96	94
Whooping cough	343	338	375	314

JAMAICA

Communicable diseases—4 weeks ended June 10, 1939.—During the 4 weeks ended June 10, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	11	37	Leprosy		2
Diphtheria	2	5	Puerperal fever		2
Dysentery	3	6	Tuberculosis	38	74
Erysipelas		1	Typhoid fever	7	43

PANAMA CANAL ZONE

Notifiable diseases—January–March 1939.—During the months of January, February, and March 1939, certain notifiable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	January		February		March	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	44		52		78	
Diphtheria	18		6		7	
Dysentery (amoebic)	19	3	9		8	
Dysentery (bacillary)	5	4	13	1	7	2
Leprosy	1	1		1		
Malaria	100	4	67	2	32	2
Measles	1		2		2	
Meningococcus meningitis	1		1			
Mumps	1				1	
Pneumonia		39		20		22
Poliomyelitis			1		1	1
Tuberculosis		30		22		81
Typhoid fever	6		3		2	
Undulant fever					1	
Whooping cough			[1] 2		[1] 1	

[1] In the Canal Zone only.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for June 30, 1939, pages 1182–1194. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

India—Madras.—During the week ended June 17, 1939, 1 case of cholera was reported in Madras, India.

Plague

Bolivia—Santa Cruz Department—Sara Province.—During the month of March 1939, 1 case of pneumonic plague was reported in Sara Province, Santa Cruz Department, Bolivia.

Peru.—During the month of April 1939, plague was reported in Peru as follows: Lambayeque Department, 1 case, 1 death; Libertad Department, 2 cases; Lima Department, 1 case; Piura Department, 7 cases, 1 death.

United States.—A report of plague infection in Lincoln County, Washington, and in Ventura County, California, appears on page 1244 of this issue of PUBLIC HEALTH REPORTS.

Smallpox

Bolivia.—During the month of March 1939, smallpox was reported in Bolivia as follows: Cochabamba Department, 8 cases; La Paz Department, 8 cases, including 7 cases in La Paz; Oruro Department, 1 case; Potosi Department, 1 case; Santa Cruz Department, 6 cases.

Typhus Fever

Bolivia.—During the month of March 1939, typhus fever was reported in Bolivia as follows: Cochabamba Department, 1 case; Potosi Department, 7 cases; Tarija Department, 1 case.

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Public Health Reports

VOLUME 54 JULY 14, 1939 NUMBER 28

IN THIS ISSUE

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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PREVALENCE OF DISEASE

Public Health Reports

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PREVALENCE OF POLIOMYELITIS

For the week ended July 8, 1939, the poliomyelitis situation, so far as the country as a whole is concerned, remained about the same as during the preceding week. A total of 84 cases was reported for the current week, as compared with 80 for the week ended July 1 and with a 5-year median of 156.

Only 8 States reported 4 or more cases for the week ended July 8, and only 3 States reported more than 6 cases. As compared with the preceding week, South Carolina dropped from 29 to 20 cases, North Carolina increased from 3 to 6, Georgia from 4 to 10, Florida from 0 to 4, and California from 16 to 18.

The relative significance of these figures is best shown by case rates. The figures for the week ended July 8 give South Carolina an annual rate of 55 per 100,000 population, North Carolina 9, Georgia 17, Florida 12, and California 15. Wyoming, with only 1 case, had a rate of 22, and Arizona, with only 1 case, a rate of 12. With the exception of South Carolina, this index of prevalence of poliomyelitis for the week is not as high in some of the States reporting the largest numbers of cases as that of less populous States reporting a smaller number.

THE INCIDENCE OF CANCER[1] IN ATLANTA, GA., AND SURROUNDING COUNTIES[2]

By JOSEPH W. MOUNTIN, *Senior Surgeon*, HAROLD F. DORN, *Statistician*, and BERT R. BOONE, *Passed Assistant Surgeon, United States Public Health Service*

For more than half a century, the increase in the number of deaths attributed to cancer in the mortality reports of most countries has attracted the attention of physicians, vital statisticians, public health officials, and biologists as well as that of the general public. However, no general agreement has been reached as to whether the recorded increase is real or spurious in the sense that it results from improved

[1] For the purpose of this study, reports were requested concerning every patient seen, observed, or treated for any malignant growth.

[2] From the Division of Public Health Methods in cooperation with the National Cancer Institute, National Institute of Health.

methods of diagnosis and increased accuracy in the certification of the cause of death, combined perhaps with greater care in searching for cancer. That cancer is an important medical problem is revealed by the fact that about 83 out of every 1,000 males and 115 out of every 1,000 females will die from cancer if the present reported mortality rates continue unaltered.

In spite of the interest aroused by the recorded increase in cancer mortality, very little information of general validity is available concerning the number of living persons who are afflicted with the disease. Statements are frequently made that certain types of cancer occur more frequently in one population group than in another, but these are usually based on the records of a particular institution or institutions and, consequently, may not be representative of conditions in the general population.

Although the records of individual clinics or hospitals may yield valuable data bearing upon many questions related to the occurrence and treatment of cancer, the answer to a great variety of such questions can be best obtained by an investigation of the prevalence of cancer in the general population. How many people are known to have cancer? What parts of the body are most frequently attacked? Does climate affect the occurrence of cancer? Is cancer more common among Negroes than among white persons? Which groups are attacked most frequently? Do persons living in the open country have more or less cancer than persons living in cities? The answers to these and many similar questions depend upon a careful epidemiological investigation of cancer in representative population groups.

Moreover, these and many similar questions cannot be completely answered by the use of mortality statistics alone. It is well known that some cancers are more likely to be fatal than others. For example, cancer of the stomach terminates in death more frequently than cancer of the skin of the face. Consequently, conclusions drawn from mortality records will differ from those drawn from morbidity reports not only as to the amount of cancer but also as to the tissues or organs involved. Furthermore, as methods of therapy become more effective, the types of cancer most easily arrested will appear less and less frequently in mortality records.

Because of these considerations, a series of studies has been initiated to determine the morbidity from cancer, its variation from one part of the country to another, between the two sexes, between whites and Negroes, and at different ages. If the results of such studies are to be the basis of projection, the data should pertain to the total population of a given community and should be obtained preferably from physicians and hospitals. Previous studies have shown that information concerning the morbidity from cancer collected by means of a house-to-house canvass results in only partial reporting,

since many people do not know that they have cancer and others will not admit the fact even if they know it to be true.

Various estimates have been made of the number of persons with cancer. The most widely quoted figure is three cases per recorded death, although some believe that there may be only two cases per recorded death. These estimates, however, are based on very fragmentary data and cannot be accepted as established. Moreover, it is quite possible that the morbidity from cancer varies from one part of the country to another so that no one figure is universally applicable.

It should be remembered that, regardless of how the incidence of cancer is expressed, either as the number of cases per death or as the number of cases per 1,000 population, the estimated figure will partially depend upon the effectiveness of methods of therapy and upon the stage at which the disease is recognized. It is impracticable, if not impossible, to obtain information for other than diagnosed cases of cancer. Obviously, no information concerning persons with undiagnosed cancer or with precancerous conditions is available. Consequently, the incidence of cancer referred to in this paper is the number of known or diagnosed cancer cases.

In a community where cancer is not recognized until the disease is far advanced, the number of cases will be only slightly greater than the number of deaths. For example, if each case lives just 1 year after diagnosis of cancer is made, the case rate of illness in any given year will be equal to the mortality rate of the following year. On the other hand, if each case lives 5 years, on the average, after diagnosis, the case rate of illness at any time will be five times the mortality rate 5 years later. While the effect of delayed diagnosis cannot be entirely eliminated, an attempt has been made to minimize its influence by undertaking the study only in areas with superior medical, hospital, and clinical facilities that are reasonably accessible to all groups of the population.

For the purpose of determining the incidence of cancer throughout the United States, several communities were selected in which studies of the type described are being conducted. Only the results of the first study are discussed in this paper. In addition to the city of Atlanta, the territory included Cherokee, Clayton, Cobb, De Kalb, Douglas, Fayette, Forsythe, Fulton, and Gwinnett Counties, all of which center around Atlanta. The total population of the area in 1930 was 511,000, of which 308,000 lived in urban localities (places with 2,500 or more population) and 203,000 lived in rural areas. About one-fourth of the population was Negro.

Since this is the first in a series of similar inquiries, the general plan and technique will be described in some detail. The study was conducted with the endorsement and cooperation of the State

Schedule used in survey of incidence of cancer

[This information is confidential and will be used for statistical purposes only]

	Name of patient (please print): Surname (For married women give own name and husband's first name)	Name of patient (please print): First name, initial, and Mr., Mrs., or Miss	City or county: Actual residence not post office address	Sex: M or F	Color: W or C	Age Jan. 1, 1939	Alive Jan. 1, 1939: Yes or no	First seen with cancer: Mo.	First seen with cancer: Year	Last treated for cancer: Mo.	Last treated for cancer: Year	Last seen (Includes cases still observed but no longer treated for cancer): Mo.	Last seen: Year	Microscopic diagnosis (yes or no)	Type of cancer	Primary site if cancer of skin, enter as "skin of ——"	Other sites involved (Enter each site involved even if it has been treated by surgery, X-ray, or radium)
	Sample entry: Doe	John, Mrs. (Mary L)	Atlanta	F	W	57	Yes	April	1936	Dec.	1937	Nov.	1938	Yes	Epithelioma	Lip	None.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

If you have no case, write "no case" and return.

Report every patient, including those in hospitals, whom you have seen, observed, or treated for any malignant or probably malignant growth at any time from January 1, 1938, to December 31, 1938, inclusive.

Report every case even though the patient is now dead.

Report every case seen even though referred for treatment.

Report every case which you have treated prior to January 1938 but which still reports to you for observation.

If you have not seen, treated, or observed any case during this 12-month period write "no case" in the space below and return this form to the United States Public Health Service in the accompanying addressed envelope which requires no postage.

and local health departments and the local medical and hospital societies. Reports were solicited only from physicians, hospitals, and clinics, but an effort was made to obtain a response from every such source. The schedule form used made provision for recording name, address, sex, color, and age of the patient, whether alive or dead, date first seen, dates last seen and last treated for cancer, method of diagnosis, and site or sites affected; forms were mailed to each physician, hospital, and clinic in the area. The field staff assisted in compiling the data from office records when requested to do so by the respondent. A personal visit was made to every physician, hospital, and clinic that failed to return the form promptly. Less than 3 percent of the potential respondents failed to cooperate.

In studies of this nature it is essential to eliminate two important types of error. One arises from the fact that many cancer cases are seen or treated by more than one physician; the other results from the fact that a certain proportion of the cases under treatment at any time will be nonresidents. Failure to correct for the effect of either of these sources of error would fictitiously increase the case rate of illness from cancer in the population under study. By securing the name and the county or city of residence for each patient it was possible to distinguish nonresident cases and those reported more than once.

The importance of eliminating these two sources of error is revealed by the fact that 32 percent of the reported cases were not residents of the area and that 17 percent of the cases were reported by more than one respondent. The duplicate cases, 540 in all, were reported 1,249 times. If the duplicates had not been detected the number of cases would have been increased 22 percent.

The number of reported cases of cancer among residents of the area was 2,164. In addition, information was obtained for 1,036 nonresident cases, making a total of 3,200 cases.[3] During the year 1937, 425 deaths among residents of the study area attributed to cancer were reported to the State health department. All except 99 of these deaths were reported as cases by a physician, hospital, or clinic in connection with the incidence study.

The fact that 23 percent of the recorded deaths of residents of the area were not reported as cases should not be interpreted as meaning that a corresponding proportion of living cases were unreported. Investigation revealed that a large proportion of the certificates for these deaths were attested to by the health officer or coroner without having attended the case; in other instances the deaths were certified by a physician who had subsequently died or moved away. When-

[3] With the exception of the data in table 3, which are based on resident cases and deaths, the following discussion refers to all cases reported, both resident and nonresident. The data were tabulated by residence, but since the two sets of cases were apparently very similar they were combined except when specifically stated otherwise.

ever the physician who signed the death certificate could be located, he was requested to supply information concerning the case, but not infrequently he would report that the case had been attended only at death and consequently he had only limited knowledge of the condition. It is believed that a small number of the cases of cancer also were not reported by some physicians who had to depend upon their memory instead of written records. As a rule these physicians were in general practice and saw only a limited number of cancer patients or even none at all. The actual number of cases of cancer among residents of the territory may, therefore, be somewhat larger than that actually reported.

About one-half of the physicians stated that they either did not treat cancer or that they had treated none during the study year, 1937. Less than 10 percent of the physicians reported more than five cases. Slightly more than one-half of the cases were obtained only from hospitals or clinics, 36 percent were reported only by physicians, and the remaining 12 percent were reported by combinations of these sources.

Since the value of a study of this nature depends not only on the completeness with which the cases are reported but also on the accuracy with which the diagnosis is made, each respondent was requested to specify whether or not the diagnosis of cancer was confirmed by a microscopic examination of tissue. The tissue for such examination may have been obtained through biopsy, operation, or post mortem. The reports showed that microscopic examination was made for slightly more than one-half of the reported cases (table 1). However, 61 percent of the cases receiving treatment from a hospital or clinic had the diagnosis confirmed by microscopic examination of tissue, as compared with only 37 percent of the cases not reported by a hospital or clinic.

TABLE 1.—*Number and percentage of cases of cancer with a microscopically confirmed diagnosis, by sex, color, and whether or not reported by a hospital, Atlanta, Ga., and surrounding territory, 1937*

Sex and color	Reported by hospital			Reported by physician only		
	Total number	Number with microscopic diagnosis	Percent	Total number	Number with microscopic diagnosis	Percent
White:						
Male	827	373	45.1	503	155	30.8
Female	950	669	70.4	598	257	43.0
Colored						
Male	52	29	55.8	8	3	
Female	227	175	77.1	35	8	
Total	2,056	1,246	60.6	1,144	423	37.0

Irrespective of whether or not they were receiving treatment in a hospital, a larger proportion of women than of men were reported to have had a microscopically confirmed diagnosis. In part, at least,

this reflects the fact that the diagnosis of cancer of the uterus and breast, which comprises one-half of the reported cases among women, is confirmed by microscopic examination of tissue more frequently than the diagnosis of most other forms of cancer.

A microscopic method of diagnosis was reported for a larger proportion of the Negro than of the white cases. This is probably due to the fact that skin cancer, which makes up more than one-fourth of all types among white persons, is relatively rare among Negroes. The diagnosis of this type of cancer is frequently established without microscopic examination of tissue.

Whether or not the diagnosis of cancer is confirmed by a microscopic examination depends largely upon the accessibility of the tissue affected, especially for living cases. This is true irrespective of whether the patient is treated in a hospital, although, as a group, hospitalized cases of cancer have the diagnosis confirmed more frequently by microscopic examination of tissue than do cases not treated in a hospital. (When the records of dead cases are included, this statement must be modified, since many necropsies are performed on cases with "inaccessible" cancer.) In more than three-fourths of living and dead cases with cancer of the uterus, kidneys, bladder, and brain, the diagnosis was confirmed microscopically. On the other hand, only one-fifth of the diagnoses of skin cancer were confirmed microscopically (table 2), but, as stated previously, physicians commonly establish this diagnosis without tissue examination.

TABLE 2.—*Percentage of cases of cancer by method of diagnosis, primary site, and whether or not reported by a hospital, Atlanta, Ga., and surrounding territory, 1937* [1]

Primary site	Percentage of cases with a microscopic diagnosis		
	Total	In hospital	Not in hospital
Buccal cavity, pharynx	47.7	54.8	34.8
Lip	28.5	36.4	14.7
Others	78.7	78.9	63.8
Digestive tract [2]	50.0	52.7	43.7
Intestines, stomach, rectum, anus, duodenum	49.2	52.6	39.7
Others	52.3	52.9	51.4
Respiratory system	51.6	52.5	50.0
Genitourinary system	74.9	81.0	58.1
Uterus	79.9	86.0	61.1
Kidneys, bladder	77.5	82.0	67.9
Prostate	52.6	61.4	30.8
Others	67.6	70.4	59.4
Breast	73.2	81.9	53.4
Skin	21.3	30.6	9.9
Brain	81.1	71.4	82.1
All others	53.2	60.0	41.0
Total	52.2	60.6	37.0

[1] The number of cases is given in the appendix, table 1.

[2] Includes mesentery and peritoneum.

There are several ways in which the incidence of cancer may be expressed. One expression would be analogous to a crude death rate, that is, the number of cases of cancer per 1,000 population. Since nearly 9 years has elapsed following the last general census of population, it is difficult to obtain accurate estimates of the population for small areas such as counties. Consequently it has been necessary to adopt another measure of incidence, namely, the ratio of the number of cases of cancer to the number of deaths from cancer. If a reasonably accurate estimate of the death rate is available, the case rate of illness can be estimated by multiplying the death rate by the ratio of cases to deaths, once the ratio of cases to deaths has been established.

The number of cases alive at any time during 1937 per recorded death from cancer was 5.3 (table 3). The death rate from cancer in this area was about 70 per 100,000 population at the date of the last census; hence the case rate of illness is at least 370 per 100,000 population. Since the death rate has undoubtedly increased since 1930, the case rate of illness in 1937 probably was at least 400 per 100,000 population, or 4 per 1,000 population.

TABLE 3.—*Number of cases of cancer alive at any time during the year per recorded death from cancer during the year, by color and sex, Atlanta, Ga., and surrounding counties, 1937 (resident cases only)*

Area	Total			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Atlanta	5.3	4.9	5.6	5.8	5.7	5.8	4.0	2.3	4.9
Other urban localities	4.6	5.2	4.3	4.6	4.9	4.3			
Total urban	5.3	4.9	5.4	5.6	5.6	5.6	4.0	2.5	4.9
Total rural	5.6	6.0	5.4	5.8	6.0	5.7	3.2		2.8
Total	5.3	5.1	5.4	5.7	5.7	5.6	4.0	2.5	4.7

The number of cases per death was markedly greater for whites (5.7) than for Negroes (4.0). These ratios indicate case rates of illness of at least 450 per 100,000 white population and 250 per 100,000 colored population (fig. 1).

The higher number of cases per death for the white population resulted in large part from the very low ratio for Negro males, 2.5; but the ratio for Negro females, 4.7, was also less than that for white females, 5.6. It seems likely that this difference between whites and Negroes arises in part from the fact that a larger proportion of Negroes than whites fail to obtain medical care until the disease is well developed; hence they do not live as long after diagnosis is established as do white persons who obtain treatment at an earlier stage of the disease. Moreover, the expectation of life of white persons is about 12 years greater than that for Negroes. Since cancer is especially

prevalent among persons in late adult life, a larger proportion of Negroes than of whites die from causes other than cancer before they reach the ages when cancer is most likely to develop. It is also possible that there either is less cancer or that it is more lethal among Negroes than among whites, but such an explanation should not be accepted until it can be shown that other factors do not account for the difference. The factor of site will be discussed later.

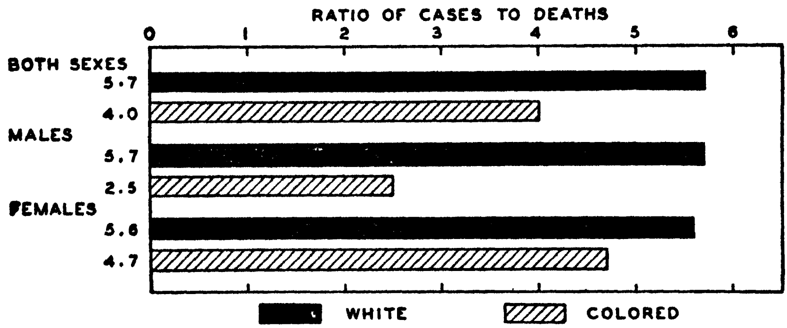

FIGURE 1.—Number of cases of cancer alive at any time during the year per recorded death from cancer during the year, by sex and color, Atlanta, Ga., and surrounding counties, 1937.

When interpreting the data in table 4, it should be remembered that the age distribution of the cases depends to a certain extent upon the age distribution of the population. Although cancer is often considered to be a disease of late adult life and old age, 449, or 14.0 percent, of the reported cases were less than 40 years of age. A slightly greater proportion of the women than of the men were less than 40 years of age, 16.2 percent as compared with 11.1 percent.

TABLE 4.—*Number and percentage distribution by age and sex of cases of cancer, Atlanta, Ga., and surrounding counties, 1937*

Age	Percentage			Number of cases		
	Total	Male	Female	Total	Male	Female
Under 9	0.7	0 8	0.7	25	12	13
10-19	1.2	1.8	.7	38	25	13
20-29	2 9	2.5	3.0	90	35	55
30-39	9.2	6 0	11.8	296	83	213
40-49	20.0	19.5	20.4	640	271	369
50-59	22 9	22.5	23.2	732	313	419
60-69	22.4	23.0	21.8	716	320	396
70-79	13 2	15.5	11.3	421	216	205
80 and over	4.7	5.5	4.3	152	75	77
Unknown	2.8	2.9	2.8	90	40	50
Total	100.0	100.0	100.0	3,200	1,390	1,810

About one-half of the persons with cancer were in what may be considered the main productive period of life, 30 to 60 years of age. The proportion for males in this age period, 48 percent, was slightly less than that for females, 55 percent.

The classification of the cases of cancer by type of lesion used in this paper follows that of the International List of Causes of Death. The advantages of being able to compare the results of this study with available mortality records were considered to outweigh the disadvantages of using the International List classification.

The skin was the most frequent site of cancer among males, accounting for 37 percent of the total reported cases (table 5). Among females, cancer of the skin, breast, and cervix each comprised about 20 percent of the total number of cases. With the exception of the fundus of the uterus no other site accounted for more than 3 percent of the total number of cancers among women. For the males, cancer of the lip and of the prostate made up 12 percent and 7 percent, respectively, of the total cancers, with the remaining cases widely scattered among the other sites. The greatest differences between the sexes are for cancer of the skin and lip, which are more frequent for males, and cancer of the breast, which is primarily a disease of the females. Lesions of the respiratory system and digestive tract are also more frequent among males.

TABLE 5.—*Percentage distribution of cases of cancer by primary site, sex and color, Atlanta, Ga., and surrounding territory, 1937* [1]

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity, pharynx	17.8	4.2	18.0	4.4	11.7	3.1
Lip	11.9	1.1	12.5	1.2	----------	.4
Tongue	1.5	.4	1.5	.5	1.7	----------
Mouth	1.1	.6	1.1	.4	----------	1.5
Jaw	1.2	.9	1.0	1.0	5.0	.4
Pharynx	.4	.1	.3	.1	1.7	----------
Others	1.7	1.1	1.6	1.2	3.3	.8
Digestive tract	13.4	8.9	12.8	9.2	26.7	7.6
Esophagus	.6	.6	.6	.7	----------	.4
Stomach and duodenum	4.7	1.5	4.2	1.2	16.7	3.4
Intestines	3.5	3.0	3.4	3.2	5.0	2.3
Rectum and anus	2.3	1.9	2.4	2.1	----------	.7
Liver and biliary passages	.8	1.2	.7	1.3	1.7	.4
Pancreas	1.1	.5	1.1	.6	3.3	----------
Mesentery and peritoneum	.4	.2	.4	.1	----------	.4
Respiratory system	3.7	.7	3.7	.7	3.3	.8
Larynx	1.2	.3	1.2	.2	----------	.4
Lungs and pleura	2.0	.4	2.0	.5	1.7	.4
Others	.5	----------	.5	----------	1.6	----------
Genitourinary system	12.6	36.0	11.8	32.7	40.0	55.3
Uterus (body)	----------	7.9	----------	7.2	----------	11.8
Cervix	----------	21.8	----------	18.9	----------	38.9
Kidneys	.8	.9	.7	.9	3.3	.8
Bladder	2.7	1.4	2.5	1.6	5.0	.4
Prostate	7.0	----------	6.2	----------	25.0	----------
Others	2.1	4.0	1.9	4.1	6.7	3.4
Breast	----------	21.4	.1	21.1	----------	22.9
Skin	36.9	20.4	38.5	23.1	1.7	4.2
All others	15.6	8.4	15.6	8.8	16.6	6.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

[1] The number of cases is given in the appendix, table 3.

With the exception of cancer of the skin, no single lesion is predominantly frequent among males. Cases of cancer among females, on the other hand, are fairly well concentrated into three main groups—skin, breast, and uterus (fundus and cervix), which include more than 70 percent of all reported cancers (fig. 2).

There are a number of interesting differences in the relative frequency of various sites of cancer between whites and Negroes. It

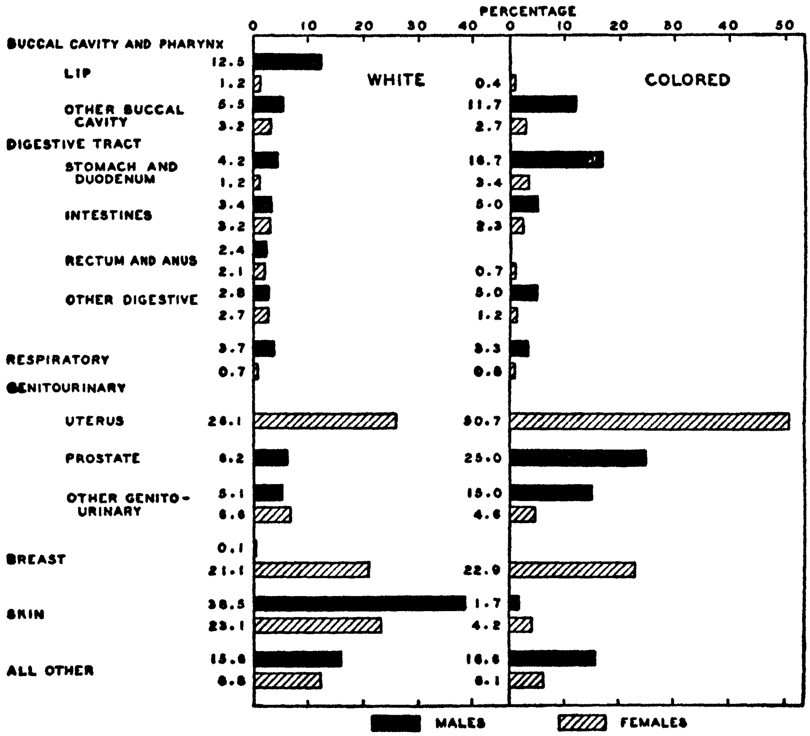

FIGURE 2.—Percentage distribution of cases of cancer by primary site, sex, and color, Atlanta, Ga., and surrounding counties, 1937.

should be remembered that the frequency of occurrence of various lesions depends to a certain extent upon the age distribution of the two groups since not all lesions develop at the same age. The number of cases of cancer among Negro males is too small to be more than merely indicative, but the distribution of sites affected is fairly reliable for Negro females. The most striking difference is the very low incidence of skin cancer among Negroes, 2 percent for males and 4 percent for females, compared with 38 percent and 23 percent, respectively, for white males and females. This is in agreement with the observation that skin diseases are generally less frequent in the Negro race. Cancer of the lip, which is a frequent site among white males, is also very rare among Negroes. The principal sites for Negro

females are the breast and genitourinary system. These include nearly 80 percent of all reported cases.

Since the various forms of therapy now in use are not uniformly effective against all types of lesions, and since some tumors are less malignant than others, the frequency of occurrence of different sites varies markedly between living and dead cases (table 6). Cancer of the skin, which accounts for 37 percent of the cases of cancer among males and 20 percent of the cases among females, comprises only 6

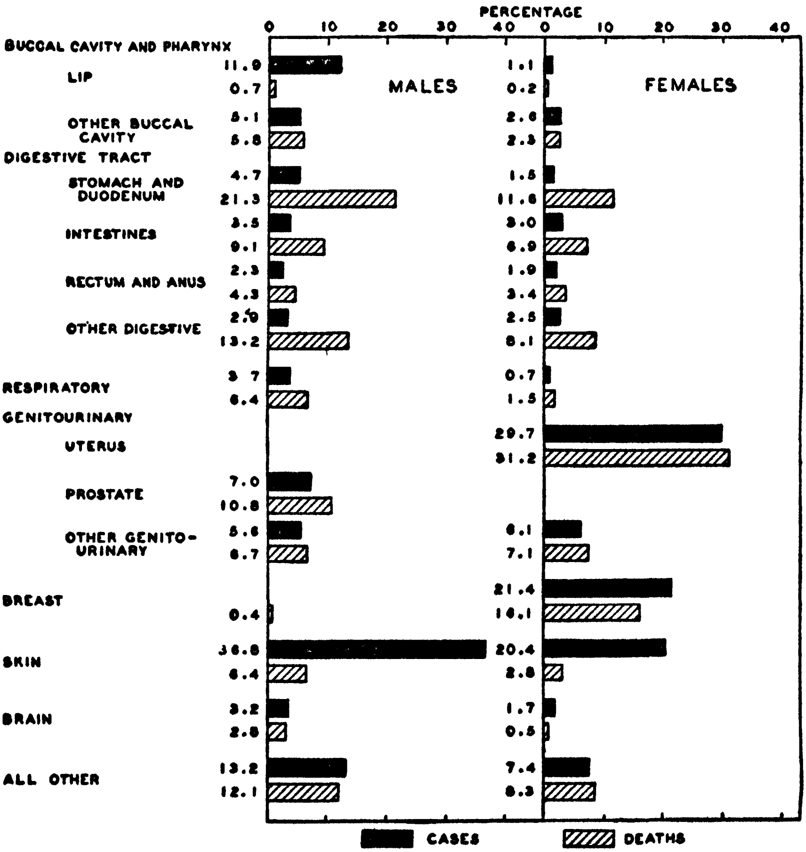

FIGURE 3.—Percentage distribution by primary site and sex of reported cases of cancer and recorded deaths from cancer, Atlanta, Ga., and surrounding counties, 1937. (Deaths are for the State of Georgia.)

percent of the male deaths from cancer and 3 percent of the female deaths. On the other hand, cancer of the digestive tract, which includes nearly 50 percent of all male deaths from cancer and 30 percent of all female deaths, is reported about one-fourth as frequently among living cases (fig. 3).

More than 40 percent of all deaths from cancer among males are attributed to the stomach, prostate, and intestines. Among females, the uterus, breast, and stomach comprise nearly 60 percent of all sites

reported on death certificates. The uterus and breast are the only two important sites reported with approximately the same relative frequency among both living and dead cases of cancer.

TABLE 6.—*Percentage distribution by primary site and sex for reported cases and recorded deaths from cancer, Atlanta, Ga., and surrounding territory, 1937* [1]

Primary site	Male		Female	
	Cases	Deaths	Cases	Deaths
Buccal cavity, pharynx	17.0	6.5	3.7	2 5
Lip	11.9	.7	1.1	.2
Tongue	1 5	1.1	.4	.3
Mouth	1.1	1.2	.6	.6
Jaw	1.2	1.7	.9	.3
Pharynx	.4	1.1	.1	.8
Others	.9	.7	.6	.3
Digestive tract	13 4	47.9	8.9	30 0
Esophagus	.6	1.4	.6	1.0
Stomach and duodenum	4.7	21.3	1 5	11.6
Intestines	3 5	9.1	3 0	6 9
Rectum and anus	2.3	4 3	1 9	3.4
Liver, biliary passages	8	7.6	1.2	5 7
Pancreas	1.1	3.7	.5	1 2
Mesentery, peritoneum	.4	.5	.2	.2
Respiratory system	3.7	6.4	.7	1 5
Larynx	1.2	.6	.3	.1
Lungs, pleura	2 0	4.4	.4	1 0
Others	.5	1.4		.4
Genitourinary system	12 6	17.5	35 8	38 3
Uterus			29.7	31 2
Kidneys	8	1.4	.9	1 2
Bladder	2 7	3 3	1.4	2 2
Prostate	7.0	10 8		
Others	2.1	2.0	3.8	3 7
Breast		.4	21.4	16 1
Skin	36 9	6 4	20.4	2.8
Brain	3.2	2 8	1 7	.5
Bones (except jaw)	1.4	1 2	1 0	.6
All others	11.8	10.9	6 4	7 7
Total	100.0	100.0	100.0	100.0

[1] In order to have a sufficiently large number of deaths to provide a stable distribution by site, the number of deaths for the entire State of Georgia was used.

Table 7 presents the proportion of cases of cancer of certain primary sites with a recognized and reported metastasis. Whether or not the reported lesion had metastasized from the original primary site depends upon many factors, among them the stage of the disease at which treatment was begun, and the thoroughness of the examination. Slightly more than one-fourth of the persons with cancer were reported to have a metastatic lesion. This proportion varies widely from one site to another. The primary sites with the smallest percentage of metastases are the brain, skin, bladder, and lip, less than one-fifth of each having one or more additional sites reported, while the sites with most frequent metastasis are the breast, stomach, and intestines, nearly one-half of which had a secondary involvement. A high percentage of metastases was also reported for several other sites but the number of cases involved is too small to permit definite conclusions.

TABLE 7.—*Number and percentage of cancer cases with reported metastasis, by primary site, Atlanta, Ga., and surrounding territory, 1937*

Primary site	Total number	Number with metastasis	Percent with metastasis
Buccal cavity	323	66	20.4
Lip	186	28	15.1
Tongue	29	10	34 5
Mouth	25	10	40.0
Jaw	33	6	18.2
Pharynx	6	2	33 3
Others	44	10	22.7
Digestive tract	348	128	36 8
Esophagus	20	5	25 0
Stomach, duodenum	93	38	40 9
Intestines	93	39	41 9
Rectum, anus	66	15	22 7
Liver, biliary passages	33	14	42.4
Pancreas	25	13	52.0
Mesentery, peritoneum	8	4	50 0
Respiratory system	64	19	29 7
Larynx	21	2	9 5
Lungs, pleura	36	13	36 1
Others	7	4	57 1
Genitourinary system	826	228	27.6
Uterus (body)	143	41	28 7
Cervix	395	87	22 0
Kidney	27	10	37 0
Bladder	62	11	17 7
Prostate	97	29	29.9
Others	102	50	49.0
Breast	388	176	45 4
Skin	882	155	17 6
Brain	74	4	5 4
Bones	38	10	26 3
All others	257	56	21 8
Total	3,200	842	26.3

The data in table 8 and figure 4 show that lesions of certain organs or tissues develop at a younger age than those of other organs. Although cancer is primarily a disease of late adult life and old age, some forms occur predominantly in young persons. The outstanding example of the latter is cancer of the brain. More than one-half of the persons with cancer of the brain were less than 35 years old. The number of reported cases was fairly small so that the percentage distribution by age is somewhat irregular, but the general tendency is unmistakable. Other sites reported frequently at the younger ages were the kidneys, bladder, and respiratory system.

Cancer of the prostate, on the other hand, occurs mainly among the aged, 78 percent of the reported cases being 65 or more years of age. About 40 percent of the persons with cancer of the skin were also 65 or more years of age.

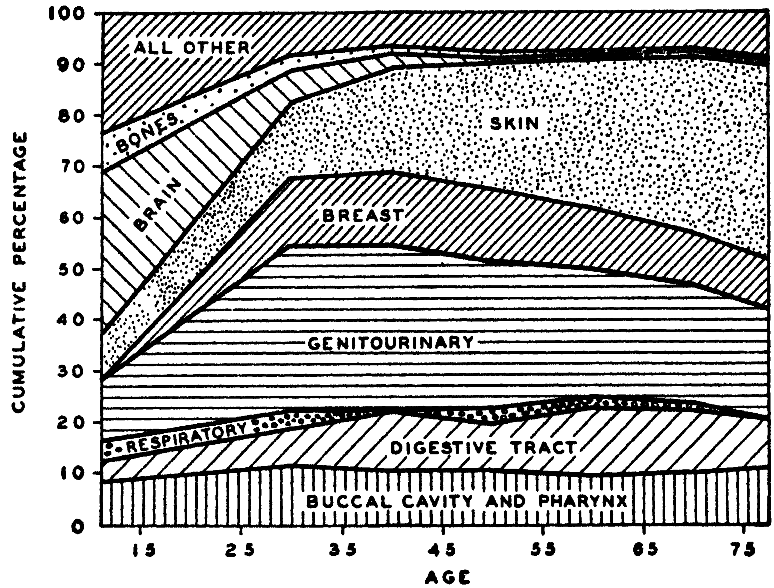

FIGURE 4.—Percentage distribution of cases of cancer by age and primary site, Atlanta, Ga., and surrounding counties, 1937.

TABLE 8.—*Percentage distribution of cases of cancer by age and primary site, Atlanta, Ga., and surrounding territory, 1937* [1]

Primary site	Age in years							
	Under 25	25-34	35-44	45-54	55-64	65-74	75 and over	Unknown
Buccal cavity, pharynx	2 5	5.9	15.8	23 8	22.3	18.0	10.2	1.5
Lip	2.2	6.5	16.7	24 7	18 8	22.0	7.0	2.1
Others	2.9	5.1	14.6	22.6	27.0	12.4	14.6	.8
Digestive tract [2]	1.2	3.2	16.4	17.5	28.4	21.3	8.6	3.4
Stomach, intestines, rectum, anus	1.5	3.0	17.1	18.6	26 6	20.2	9.1	3.8
Others	-------	3.5	14.1	14.1	34.1	24.7	7.1	2.4
Respiratory system	4.7	7.8	8.1	32.8	26.6	14 1	-------	10.9
Genitourinary system	1.4	6.2	10.1	23.5	23 1	16.5	8.0	2.2
Uterus	.4	7.4	24.5	27.5	21 8	12 6	4.1	1.7
Prostate	-------	-------	1.0	6.2	21.7	43.3	24.7	3 1
Kidneys, bladder	6.7	3.4	6.7	13.5	36 0	18.0	11.2	4.5
Others	3.9	7.8	18.6	27.5	20.6	9.8	9.8	2.0
Breast	-------	5.7	19.1	25.5	23.4	14 7	7.2	4.4
Skin	.9	2.6	11.2	19.4	24.8	23.7	15.3	2.1
Brain	40.5	13 5	18.9	10 8	14.9	1.4	-------	-------
All others	9.8	6.1	13 6	19 3	20.3	15.9	10.5	4.5
Total	2.9	5.0	15.5	21.5	23.8	18.4	10.1	2.8

[1] The number of cases is given in the appendix, table 4.
[2] Includes mesentery and peritoneum.

SUMMARY

Three thousand two hundred cases of cancer were reported under observation or treatment in Atlanta, Ga., and surrounding territory during 1937. Of these, 2,164 were residents and 1,036 were nonresidents of the area.

The number of cases per recorded death attributed to cancer was 5.3 for the total population, 5.7 for the white population, and 4.0 for the colored population. These ratios correspond to case rates of illness of approximately 400, 450, and 250 per 100,000 population, respectively. The lower rate among Negroes may result from failure to seek medical care and a shorter length of life. It is also possible that cancer (total and for certain sites) really is less common in the colored population.

About one-half of the persons with cancer were in the main productive period of life, namely, 30 to 60 years of age. However, 14 percent of the reported cases were less than 40 years of age.

The most frequent site of cancer among males was the skin, which comprised 37 percent of all reported cases. Among females, cancer of the skin, breast, and cervix each made up about 20 percent of the total number of cases. Cancers of the skin and lip, respiratory system, and digestive tract were more frequent among males, while cancer of the breast and genitourinary system were more common among females.

Cancer of the skin, which accounted for 38 percent of all lesions among white males and 23 percent among white females, included only 2 percent of all lesions among Negro males and 4 percent among Negro females. Cancer of the lip is also rare among Negroes. Lesions of the breast and genitourinary system included nearly 80 percent of all reported sites for Negro females.

There are large differences in the frequency with which different kinds of cancer are reported for living and dead cases. More than 40 percent of all male deaths attributed to cancer are from lesions of the stomach, prostate, and intestines, which comprise only 15 percent of the reported lesions among living cases.

Among females, lesions of the breast, uterus, and stomach are reported for nearly 60 percent of the deaths assigned to cancer. Of these, lesions of the breast and uterus are the only ones which occur with approximately the same relative frequency among both living and dead cases of cancer.

Cancer of the digestive tract, to which is attributed nearly 50 percent of all male deaths from cancer and 30 percent of all female deaths, makes up only about one-fourth as large a proportion of the lesions of living cases.

Although cancer is primarily a disease of late adult life, certain types of lesions occur rather frequently in young persons. More than one-

half of the persons with cancer of the brain were less than 35 years old. Cancer of the kidneys, bladder, and respiratory system was also reported frequently among young persons.

APPENDIX

TABLE 1.—*Number of cases of cancer by method of diagnosis, primary site, and whether or not reported by a hospital, Atlanta, Ga., and surrounding territory, 1937*

Primary site	Number of cases reported			Number of cases with microscopic diagnosis		
	Total	In hospital	Not in hospital	Total	In hospital	Not in hospital
Buccal cavity, pharynx	323	208	115	154	114	40
Lip	186	118	68	53	43	10
Others	137	90	47	101	71	30
Digestive tract [1]	348	245	103	174	129	45
Intestines, stomach, rectum, anus, duodenum	262	194	68	129	102	27
Others	86	51	35	45	27	18
Respiratory system	64	40	24	33	21	12
Genitourinary system	826	609	217	619	493	126
Uterus	538	407	131	430	350	80
Kidneys, bladder	89	61	28	69	50	19
Prostate	97	70	26	51	43	8
Others	102	71	32	69	50	19
Breast	388	270	118	284	221	63
Skin	882	487	395	188	149	39
Brain	74	7	67	60	5	55
All others	295	190	105	157	114	43
Total	3,200	2,056	1,144	1,669	1,246	423

[1] Includes mesentery and peritoneum.

TABLE 2.—*Number of reported cases of cancer and number of recorded deaths from cancer by color and sex, Atlanta, Ga., and surrounding counties, 1937* [1]

Area	Reported cases				Deaths not reported as a case				Total recorded deaths			
	White		Colored		White		Colored		White		Colored	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Atlanta	469	815	52	239	19	25	13	15	85	144	28	52
Other urban places	71	95	4	3	3	4	------	1	15	23	------	1
Total urban	540	910	56	242	22	29	13	16	100	167	28	53
Total rural	173	231	2	10	6	9	------	4	30	42	------	5
Total	713	1,141	58	252	28	38	13	20	130	209	28	58

[1] Includes only resident cases and deaths.

TABLE 3.—*Number of cases of cancer by primary site, sex, and color, Atlanta, Ga., and surrounding territory, 1937*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity, pharynx	247	76	240	68	7	8
Lip	166	20	166	19	----------	1
Tongue	21	8	20	8	1	----------
Mouth	15	10	15	6	----------	4
Jaw	16	17	13	16	3	1
Pharynx	5	1	4	1	1	----------
Others	24	20	22	18	2	2
Digestive tract	186	162	170	142	16	20
Esophagus	8	12	8	11	----------	1
Stomach and duodenum	66	27	56	18	10	9
Intestines	48	55	45	49	3	6
Rectum and anus	32	34	32	32	----------	2
Liver and biliary passages	11	22	10	21	1	1
Pancreas	16	9	14	9	2	----------
Mesentery and peritoneum	5	3	5	2	----------	1
Respiratory system	51	13	49	11	2	2
Larynx	16	5	16	4	----------	1
Lungs and pleura	28	8	27	7	1	1
Others	7	----------	6	----------	1	----------
Genitourinary system	175	651	151	506	24	145
Uterus (body)	----------	143	----------	112	----------	31
Cervix	----------	395	----------	293	----------	102
Kidneys	11	16	9	14	2	2
Bladder	37	25	34	24	3	1
Prostate	97	----------	82	----------	15	----------
Others	30	72	26	63	4	9
Breast	1	387	1	327	----------	60
Skin	513	369	512	358	1	11
All others	217	152	207	136	10	16
Total	1,390	1,810	1,330	1,548	60	262

TABLE 4.—*Number of cases of cancer by age and primary site, Atlanta, Ga., and surrounding territory, 1937*

Primary site	Age in years										Total
	Under 14	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	Unknown	
Buccal cavity, pharynx	2	6	19	51	78	72	58	30	8	5	323
Lip	1	3	12	31	46	35	41	12	1	4	186
Tongue	-	-	1	6	8	8	1	4	1	-	29
Mouth	-	-	-	2	7	7	6	2	-	-	24
Jaw	1	2	1	3	8	6	5	5	1	1	33
Pharynx	-	-	1	-	1	5	-	-	-	-	7
Others	-	1	4	9	7	11	5	7	-	-	44
Digestive tract, mesentery, peritoneum	1	8	11	57	61	99	74	26	4	12	348
Esophagus	-	-	-	2	3	8	6	-	-	1	20
Stomach, duodenum	-	1	2	19	17	25	20	8	-	4	96
Intestines	-	2	2	18	18	28	21	7	2	4	102
Rectum, anus	1	-	4	8	14	17	12	6	1	2	65
Liver and biliary passages	-	-	-	4	3	13	7	3	1	1	32
Pancreas	-	-	1	3	5	8	6	2	-	-	25
Mesentery, peritoneum	-	-	2	3	1	-	2	-	-	-	8
Respiratory system	2	1	5	2	21	17	9	-	-	7	64
Larynx	-	-	2	-	2	9	3	-	-	5	21
Lungs, pleura	2	-	3	1	18	5	6	-	-	2	37
Others	-	1	-	1	1	3	-	-	-	-	6
Genitourinary system	7	5	51	158	194	191	136	60	6	18	826
Uterus	-	-	8	31	44	35	15	5	2	3	143
Cervix	1	1	32	101	104	82	53	15	-	6	395
Kidneys	6	-	-	3	6	4	6	2	-	-	27
Bladder	-	-	3	3	6	28	10	7	1	4	62
Prostate	-	-	-	1	6	21	42	21	3	3	97
Others	-	4	8	19	28	21	10	10	-	2	102
Breast	-	-	22	74	99	91	57	27	1	17	388
Skin	3	5	23	99	171	219	209	109	26	18	882
Brain	16	14	10	14	8	11	1	-	-	-	74
Bones	2	5	5	8	6	7	4	1	-	-	38
All others	8	14	13	32	51	53	43	25	5	13	257
Total	41	53	159	495	688	760	591	278	45	90	3,200

ALLERGIC IRRITABILITY IN RHEUMATIC AND NEPHRITIC PATIENTS[1]

By MARK P. SCHULTZ, *Surgeon, National Institute of Health, United States Public Health Service*

Allergic irritability, so-called by Lewis and Loomis (*1*), is easily demonstrable in animals suffering from chronic infections. For example, rabbits made allergic by suitable chronic focal infections, in contrast to controls, respond with both a primary and secondary reaction at the site of injection of nonspecific antigens, and also with an increased concentration of circulating antibodies (*2*). It was, therefore, thought possible that comparable, nonspecific alterations

[1] From the Hospital of the Rockefeller Institute for Medical Research and the National Institute of Health.

in tissue reactivity might result from certain infections in man. Focal infections, especially with hemolytic streptococci, have been considered of possible etiological significance in both rheumatic fever and acute hemorrhagic nephritis (*3*, *4*, *5*); and in patients with these diseases a marked cutaneous hypersensitivity to streptococcal products has been demonstrated (*6*, *7*). It was the purpose of this investigation to study the nonspecific cutaneous reactivity to a simple foreign protein, such as rabbit serum, following focal infections in patients with these two diseases, and to compare this reactivity with the response of these patients to streptococcal nucleoprotein and tuberculin.

METHODS

On a given day the following materials were injected intracutaneously in different areas on the volar surface of the forearms, the respective test dose indicated being diluted to 0.1 cc. with normal salt solution:

1. 0.001 mg. of hemolytic streptococcus nucleoprotein (strain Q33), prepared by the method described by Lancefield (*8*).
2. 0.05 mg. of human tuberculin (O. T.).
3. 0.05 cc. of normal rabbit serum.

The reactions to nucleoprotein and tuberculin were recorded after 24 and 48 hours. For the purposes of the present study, lesions 20 by 20 by 1 mm. or larger, which were caused by the tuberculin, were considered positive. While reactions smaller than these were not infrequent, these responses seemed to give the best indications of the patients' reactivity with respect to the various agents. The areas injected with rabbit serum were inspected daily for 2 weeks or until a secondary reaction appeared. Neither immediate nor delayed 24-hour reactions were observed at the sites of serum injection. The responses of particular interest were the secondary reactions which occurred after 4 to 13 days, and which consisted of areas of edema and erythema as large as 70 by 70 by 2 mm. persisting for a few hours to several days. In all probability, these secondary reactions may be considered as local serum disease, and indicate the intensity of the patients' response to the introduction of the first dose of rabbit serum. It should be noted that they are different from the reactions, discussed by Mote and Jones (*9*), which resulted from repeated injections of this serum.

With serum obtained from bleedings made just prior to the injections and 2 weeks later precipitin tests were performed. Mixtures of 0.2 cc. of these sera were made with 0.4 cc. of rabbit serum dilutions ranging from 1:10 to 1:500,000. The mixtures were incubated 2 hours at 37° C. and refrigerated 8 hours; then the readings were made. Passive transfer tests were performed with the technique of

Prausnitz-Küstner (*10*); the site injected with 0.1 cc. of each serum tested was reinjected 24 hours later with 0.1 cc. of a 1:100 dilution of rabbit serum in normal saline. Each serum was tested on two volunteers, and controlled in each instance with serum from the preliminary bleeding.

RESULTS

There was no correlation apparent between the presence of carditis or arthritis, the degree of fever, or the age of the patient and the development of secondary reactions to rabbit serum. It also appeared that minimal therapeutic doses of antipyretic drugs, received by a few of the patients during the period of observation, were without demonstrable effect upon the outcome of the test.

In the instance of Bright's disease, it was impossible with the data at hand to dissociate the two factors of focal infection and the stage of the disease, for all patients in the acute hemorrhagic stage which were tested had also suffered recent focal infections.

A most important factor, however, associated with the type of response to intracutaneous injections of rabbit serum was recent focal infection. The findings are summarized in table 1. Secondary reactions were much more frequently observed in patients with rheumatic fever (46 percent) or Bright's disease (44 percent) than in controls (15 percent). It is apparent, moreover, that in both rheumatic and nephritic patients a recent focal infection was much more frequently accompanied by enhanced reactivity to rabbit serum than was the case with controls. Among the latter, secondary reactions were slightly more than twice as frequent in individuals with recent focal infections than in those not giving such a history. In rheumatic fever patients, on the other hand, secondary reactions were five times more frequent in those having recently suffered focal infections than in others. Because of the small number of patients with Bright's

TABLE 1.—*Incidence of positive secondary reactions to rabbit serum*

	Number of patients	Secondary reactions	
		Number	Percent
1. Rheumatic fever:			
With recent focal infection	35	31	88
Without recent focal infection	49	8	16
Total	84	39	46
2. Bright's disease:			
With recent focal infection	9	7	77
Without recent focal infection	7	0	0
Total	16	7	44
3. Other patients:			
With recent focal infection	12	3	25
Without recent focal infection	27	3	11
Total	39	6	15

disease the difference, though striking, may not be so significant. Nevertheless, there were no secondary reactions in seven individuals with no history of recent infection; while in seven of nine patients with recent infections secondary reactions developed.

REACTIONS TO HEMOLYTIC STREPTOCOCCUS NUCLEOPROTEIN AND TUBERCULIN

The groups tested with hemolytic streptococcus nucleoprotein or tuberculin are not strictly comparable. The average age of the control group was 34 years, the rheumatic 13, and the nephritic 20. It has been found that positive reactions to both these test substances are more frequent in older age groups (*6*). In patients with rheumatic fever there was a definitely greater incidence of positive reactions to hemolytic streptococcus nucleoprotein in individuals with recent focal infections than in the rheumatic group giving no history of comparable infections; such a difference was not evident in the incidence of positive tuberculin reactions (table 2). In the patients with Bright's disease a similar relationship was observed. The comparatively higher incidence of positive tuberculin reactions in the nephritic patients without recent focal infections is probably due to the fact that the average age of these patients (23 years) was somewhat greater than of those with recent infections (18 years). The relatively high incidence of positive reactions to nucleoprotein and tuberculin in the group of "other patients" (none with recent focal infection) also is probably due to the fact that this was definitely an older age group (average 34 years).

TABLE 2.—*Incidence of positive reactions to hemolytic streptococcus nucleoprotein and tuberculin intracutaneously*

	Number of patients	Positive reactions			
		Hemolytic streptococcus nucleoprotein		Tuberculin	
		Number	Percent	Number	Percent
1. Rheumatic fever:					
With recent focal infection	23	14	61	10	43
Without recent focal infection	37	13	35	16	43
Total	60	27	45	26	43
2. Bright's disease:					
With recent focal infection	8	3	37	1	12
Without recent focal infection	7	2	28	3	43
Total	15	5	33	4	27
3. Other patients:					
None with recent focal infection	23	11	48	15	65

One purpose in investigating the incidence of tuberculin and streptococcal nucleoprotein hypersensitivity in these patients was to test

the influence of these two states upon their reactivity to rabbit serum. No correlation could be established which appeared statistically significant except that among 66 patients who had not suffered recent focal infections no secondary reactions to rabbit serum were observed in the 24 who reacted negatively to both nucleoprotein and tuberculin.

CIRCULATING ANTIBODIES

Sera from 19 representative members of the several groups were tested for the presence of precipitins for rabbit serum, but there were no positive reactions. Agglutinin titers for rabbit red blood cells in the sera before and 2 weeks after the injection of rabbit serum were compared. The titers ranged from 1:40 to 1:160 with no indication of a significant change in any patient. Sera from the first and second bleedings were compared in 11 cases. The passive transfer of hypersensitivity by the Prausnitz-Küstner technique was attempted in 13 instances. A positive reaction, indicating the presence of antibodies in serum from the second bleeding, was obtained in only one case. This serum was from a rheumatic fever patient who had recently suffered a rather severe sore throat, and in whom a marked cutaneous secondary reaction to rabbit serum was observed. Because of the great difficulty in obtaining a large number of volunteers necessary for the testing of all the sera in this manner, these observations were not extended.

DISCUSSION

The phases of foreign protein sensitization in man and experimental animals have been reviewed by Rackemann (*11*). Two phases of hypersensitivity have been demonstrated: (1) One associated with a delayed response (the development of lesions only after 24 hours) and manifest in the absence of circulating antibodies; (2) a later stage in which an immediate reaction is obtained, the appearance of which is associated with the presence of antibodies in the blood serum. Since antibodies were demonstrated in the serum of only one of our patients among the number tested, it is probable that the secondary reactions observed appeared coincidently with the development of the first stage of protein sensitization. Mote and Jones (*9*) have studied the phases of foreign protein sensitization in rheumatic fever patients, observing secondary reactions in 27 (52.8 percent) of 52 patients tested with 0.01 cc. of rabbit serum. Of these 27 this reaction was the first evidence of sensitivity in 22. These authors did not direct attention to a possible correlation between the allergic state of the individuals tested and the development of hypersensitivity. The secondary reactions they observed, moreover, appeared following repeated injections of foreign protein.

Our results indicate that, especially in patients with rheumatic fever or Bright's disease, focal infections are apt to be accompanied or followed by an increased degree of allergic irritability as demonstrated with rabbit serum.

This alteration in character of reactivity could not be correlated closely with the presence or absence of hypersensitivity to hemolytic streptococcus nucleoprotein or tuberculin. It was observed, however, in those individuals who had not experienced a recent focal infection, that no secondary reactions to rabbit serum occurred in the absence of hypersensitivity both to nucleoprotein and tuberculin.

These findings suggest that a focal infection is much more apt to increase the degree of allergic irritability in patients with rheumatic fever and Bright's disease than in controls.

SUMMARY

1. Increased allergic irritability, as demonstrated by the development of secondary reactions following the intracutaneous injection of small amounts of rabbit serum, occurred more frequently in patients with rheumatic fever or Bright's disease than in controls.

2. The incidence of this increased allergic irritability was greater in individuals who had recently suffered focal infections. This effect of infection was much more frequently observed in patients with rheumatic fever or Bright's disease than in controls.

3. Correlation between the presence of hypersensitivity to hemolytic streptococcus nucleoprotein or tuberculin and increased allergic irritability could be established only insofar as that among those individuals who had not recently experienced a focal infection no secondary reactions to rabbit serum were observed in the absence of hypersensitivity both to nucleoprotein and tuberculin.

4. These observations provide further evidence that alterations in tissue reactivity are associated with the rheumatic and nephritic states.

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EXPERIMENTAL TREATMENT OF TUMORS IN MICE [1]

I. BY PHENANTHRENE DERIVATIVES

By Floyd C. Turner, *Surgeon, United States Public Health Service, National Cancer Institute*

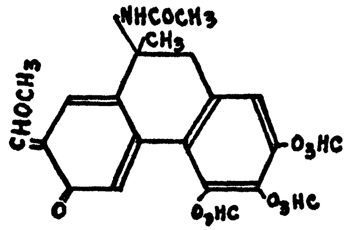
In seeking a logical approach to the treatment of tumors, it is found that salient facts are few and confusing. Many agents have caused experimental tumors in laboratory animals, for example, arsenic, viruses, coal tar, sex hormones, cancerigenic hydrocarbons, etc. In human beings, soot, radium paints, X-rays, betel-nut, sunlight, aniline dyes, and other agents have been suspected of being exciting etiological factors in tumor genesis (*1*). There appears to be no factor common to them all, yet conditions as different as X-radiation and polycyclic hydrocarbons affect tissues so that, by mutation or otherwise, a condition of irreversible unlimited proliferation is set up in certain cells.

One general difference between the physiology of normal and malignant tissues is that tumor tissue is ordinarily faster growing than normal tissue; there are proportionately more cells in the process of division in the cancerous tissues. An attempt was made to utilize that property therapeutically.

Colchicine affects mitosis both in animal and vegetable tissues (*2*). The mitoses of some cells are halted in the metaphase (*3*). There are also aberrant mitoses. The effects apparently cannot be satisfactorily prolonged. Malignant growths continue to grow grossly, in spite of poisonous doses. Regardless of this fact, however, colchicine does affect mitosis (*4*), which is evidence that there is some hope along this line of research. Some other chemical compound, of itself, or in combination with other therapeutic agencies, may yield better results.

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass. Read, in part, at the annual meeting of the American Association for Cancer Research, Richmond, Va., April 5, 1939.

The chemical structure of colchicine is thought to be (*5*):



Chemists state, with certainty, that colchicine contains a phenanthrene nucleus.

Synthesis of compounds closely related to colchicine requires laborious and prolonged investigations which are not feasible at present. The investigations reported here were undertaken as an empirical trial of compounds whose only apparent relationship to colchicine is a phenanthrene nucleus with various substituents at different positions. No high hopes were entertained as to favorable results and no outstanding findings were made. In a few instances results were obtained which probably merit further investigation.

MATERIALS AND METHODS

Most of the tests were made in male and female strain ABC mice, about 2 months old, bearing 6- or 7-day-old transplanted sarcoma 37. In order to make the tumors more readily visible, the abdomens of the mice were shaved and the tumor mash implanted into the skin (*6*). In 6 days practically 100 percent of the tumors were of a uniform size, oval in shape, half an inch long by a quarter of an inch wide, and most of them without surface discolorations. A few tests were made in C_3H female mice about 9 months of age bearing spontaneous mammary tumors.

The substances tested were prepared by Small and coworkers in a search for a remedy that is pain-relieving but not habit-forming. Since we were aware that the structural formulas of those compounds somewhat resembled that of colchicine, a request was made for samples for empirical trial. Dr. Small and Dr. Mosettig were kind enough to supply small amounts of 168 such compounds, 75 of which have been tested and are reported here.

Most of the compounds were insoluble in water, but were soluble in alcohol, ethylene glycol, or other menstruum. As both alcohol and ethylene glycol are toxic to mice, most of the tests were made with distilled water. If a compound did not go into solution, dilutions were made of a suspension. The injections were made intraperitoneally in one-half cc. total volume, unless otherwise stated. Although these

substances were insoluble in distilled water, pharmacological action was attained through peritoneal absorption. The effects on tumors of insoluble bases were often as marked as those of their soluble salts. Also, by injecting the materials as suspended crystals, it was hoped that absorption would be slower and the effects prolonged.

After injection, the mice were observed for their immediate pharmacological reaction; they were examined again in 24 hours, to note effects, if any, on the tumors, while the final results were recorded in 3 weeks, at which time the transplanted tumors, if unaffected, begin to kill the mice. The results were tabulated in three categories as to whether the tumors were (*a*) growing, (*b*) smaller, or (*c*) gone. Where the term "regressed" is used, it is meant that no visible or palpable evidence of tumor remained. The spontaneous regression rate of transplanted S–37 dermal tumors in 200 strain ABC mice was found to be 12 percent.

EXPERIMENT 1. PHENANTHRENE DERIVATIVES SUSPENDED OR DISSOLVED IN DISTILLED WATER

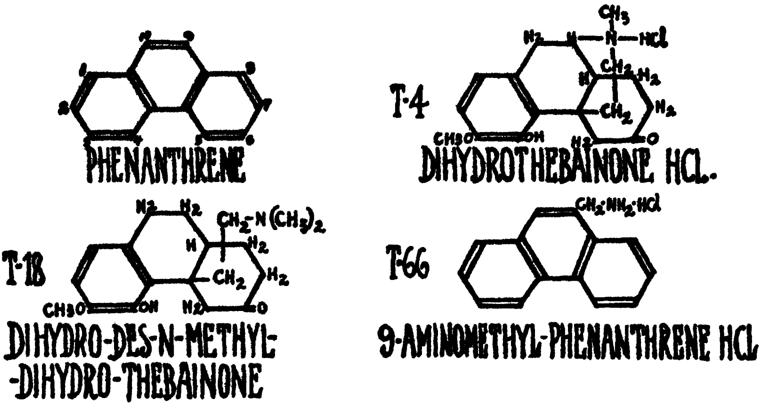
Tests were first made of the substances dissolved or suspended in distilled water. Four dilutions containing from 5 mg. to 0.005 mg. per mouse were used for each test; usually 12 mice were used to test each compound. The results were the average of all 4 dosages. Most of the substances were new; 46 of the 75 had never been tested pharmacologically.

None of the mice developed hemorrhages in tumors as a result of the treatments.

More regressions of tumors followed the use of certain groups of chemicals than of others. In 44 percent of instances the regression rate was less than the spontaneous rate of regressions. In other instances the regression rate was three or four times as great as the spontaneous regression rate. These latter rates were usually confirmed by repeated tests. The regression rate following colchicine itself, in two control experiments, was 14 percent in one test and 6 percent in the other. As with the phenanthrene compounds, doses above and below the most effective dosages were employed and the results averaged in the totals.

Table 1.—*Experiment 1. Strain ABC mice bearing dermally transplanted S–37 tumors injected intraperitoneally (one dose) with phenanthrene derivatives suspended or dissolved in distilled water*

Symbol	Name of chemical compound	Number of mice in test	Percent regressions of tumors in 3 weeks
T-1	Thebaine	15	6
T-2	Thebaine hydrochloride	24	6
T-3	Dihydrothebainone (base)	12	33
T-4	Dihydrothebainone hydrochloride	12	50
T-5	Dihydrothebainone methyl enolate:		
	Subcutaneously	23	13
	Intraperitoneally	18	0
T-6	Metathebainone	21	4
T-7	Desoxymorphine-A-salicylate	16	7
T-8	Desoxymorphine-C-hydrochloride	25	20
T-9	Dihydromorphine hydrochloride	25	5
T-10	Bromocodide hydrochloride	25	8
T-11	Dihydrodesoxycodeine-D-acid tartrate	26	15
T-12	Benzyl morphine alcoholic methyl ether hydrochloride	52	0
T-13	Dihydromorphine alcoholic ethyl ether	23	6
T-14	Alpha-iso-morphine alcoholic methyl ether (base)	19	20
T-15	Gamma-iso-morphine alcoholic methyl ether hydrochloride	19	30
T-16	Ethyl-gamma-iso-morphine hydrochloride	28	28
T-17	Des-N-methyldihydrothebainone	34	35
T-18	Dihydro-des-N-methyldihydro-thebainone	37	47
T-19	Des-N-methyldihydrothebainone methyl ether	26	19
T-20	Dihydro-des-N-methyldihydrothebainone methyl ether	11	18
T-21	Des-N-methyldihydrothebainone hydrochloride	12	0
T-22	Dihydro-des-N-methyldihydrothebainone hydrochloride	12	0
T-23	Des-N-acetyldihydro pseudo codeinone enol acetate	12	0
T-24	Dihydro-des-N-methyldihydrohydroxy codeine-B	12	8
T-25	Thebenine hydrochloride	12	8
T-26	Ethebenine hydrochloride	12	16
T-27	Triacetyl-thebenine	12	8
T-28	Thebenol	12	16
T-29	Thebenone	13	0
T-30	Dihydro-des-N-methyltetrahydrodesoxycodeine hydrochloride	13	8
T-31	Des-N-methyltetrahydrodesoxycodeine	13	15
T-32	Methyl dihydro thebainone hydrochloride	13	0
T-33	Iso-methyl-di-hydrothebainone	13	0
T-34	Ethyldihydro thebainone hydrochloride	12	0
T-35	Methyldihydrocodeinone enol acetate	12	8
T-36	Dihydrocodeinone enol acetate	12	8
T-37	Acetylmethyldihydrothebainone hydrochloride	12	8
T-38	Isomethyl-7-ketodihydrothebainone	12	0
T-39	2 [3-diethylamino-1-oxo-propyl] 9 methyl carbazole hydrochloride	12	8
T-40	2 [3-diethylamino-1-oxo-propyl] 9-methyl carbazole hydrochloride	12	0
T-41	2 [3-diethylamino-1-oxo-propyl] 9-methyl carbazole	12	0
T-42	2 [3-dimethylamino-1-hydroxy-n-propyl] 9 methyl carbazole hydrochloride	12	16
T-43	2 [3-tetrahydroisoquinolino-1-hydroxy-n-propyl] 9 methyl carbazole	13	0
T-44	3 [2-(ethylamino)-1-oxo-propyl] phenanthrene hydrochloride	13	20
T-45	3 [2-(dimethylamino)-1-oxo-propyl] phenanthrene hydrochloride	13	0
T-46	3 (2-piperidino-1-oxo-propyl) phenanthrene hydrochloride	13	0
T-47	9 (2-amino-1-oxo-propyl) phenanthrene hydrochloride	12	0
T-48	9-[2-(methylamino)-1-oxo-propyl] phenanthrene hydrochloride	13	20
T-49	9-[2-(dimethylamino)-1-oxo-propyl] phenanthrene hydrochloride	13	10
T-50	Ethylphenanthrene	13	15
T-51	2-(1-hydroxyethyl) phenanthrene	12	0
T-52	9-(1-hydroxyethyl) phenanthrene	12	16
T-53	Phenanthrene-9-carboxylic acid	12	28
T-54	3-(1 hydroxy-ethyl) phenanthrene	12	25
T-55	3 [2-(diethylamino)-1-oxo-ethyl] phenanthrene hydrochloride	12	33
T-56	3-[2-(diethylamino)-1-hydroxy-ethyl] phenanthrene	12	25
T-57	3-(2-piperidino-1-oxo-ethyl) phenanthrene hydrochloride	12	33
T-58	9-[2-(diethylamino)-1-oxo-ethyl] phenanthrene hydrochloride	12	25
T-59	9-[2-(dimethylamino)-1-hydroxy ethyl phenanthrene hydrochloride	12	16
T-60	9-(2-piperidino-1-oxo-ethyl) phenanthrene hydrochloride	11	0
T-61	Beta (9-phenanthryl) acrylic acid methyl ester	11	0
T-62	Beta (9-phenanthryl proprionic acid methyl ester	11	0
T-63	Beta (2-phenanthryl) acrylic acid	10	0
T-64	Phenanthrene-9-carboxylic acid diethylamide	12	8
T-65	Phenanthrene-3-carboxylic acid dimethylamide	14	0
T-66	9-aminomethyl phenanthrene hydrochloride	12	44
T-67	3 [-2-(1, 2, 3, 4 tetrahydroisoquinolino) 1-oxo-ethyl] phenanthrene hydrochloride	17	11
T-68	2 [2-(dimethylamino)-1-hydroxyethyl] phenanthrene	12	0
T-69	2 [-2-(diethylamino)-1-hydroxyethyl] phenanthrene	13	0
T-70	2 (-2-piperidino-1-oxo-ethyl) phenanthrene hydrochloride	13	0
T-71	2 (-2-piperidino-1-hydroxyethyl) phenanthrene hydrochloride	12	6
T-72	2-[3-(dimethylamino)-1-oxo-propyl] phenanthrene hydrochloride	12	0
T-73	2-[3-(dimethylamino)-1-oxo-propyl] phenanthrene	14	13
T-74	2-[3-(diethylamino)-1-oxo-propyl] phenanthrene hydrochloride	15	20
T-75	2 (3-piperidino-1-oxo-propyl) phenanthrene hydrochloride	15	0



Graphic chemical formulas of phenanthrene and three phenanthrene derivatives which caused regressions of dermally transplanted sarcomas in mice.

EXPERIMENT 2. PHENANTHRENE DERIVATIVES DISSOLVED IN RECOMMENDED SOLVENTS, INJECTED SUBCUTANEOUSLY

The dissolved materials, T–1 to T–43, inclusive, were injected subcutaneously at a distance from the tumors in ABC mice bearing 6-day-old transplanted S–37 dermal tumors. Ten or more mice were used for each compound. The dosages, in most instances, were small, for increased solubility was accompanied by increased toxicity. In some instances solvents, such as ethylene glycol, were, in themselves, toxic. The solvents used were olive oil, hot distilled water, dilute hydrochloric acid (N/10), and ethylene glycol. No hemorrhages occurred in the tumors and regressions occurred in only 7 instances, as follows:

T–17 dissolved in dilute HCl gave 10 percent tumor regression.
T–24 dissolved in dilute HCl gave 10 percent tumor regression.
T–26 dissolved in hot distilled water gave 10 percent tumor regression.
T–30 dissolved in hot distilled water gave 8 percent tumor regression.
T–32 dissolved in hot distilled water gave 10 percent tumor regression.
T–38 dissolved in dilute HCl gave 20 percent tumor regression.
T–42 dissolved in hot distilled water gave 33 percent tumor regression.

With 14 compounds, the tumors at the end of 3 weeks were smaller than when the injections were made. In those instances the percentage of smaller tumors ranged from 10 to 40 percent.

EXPERIMENT 3. PHENANTHRENE DERIVATIVES TESTED IN COMBINATIONS WITH COLCHICINE AND BACTERIAL FILTRATES

ABC mice bearing 6-day-old transplanted dermal S–37 tumors were injected with mixtures of the chemicals and (*a*) colchicine, 1 mg. per cc.; (*b*) *B. prodigiosus* filtrate diluted 1 to 50 (the organisms had been grown in synthetic culture medium); and (*c*) a 1 to 100 dilution

of a *B. prodigiosus* filtrate, the organisms of which had been cultured in broth. The doses of the chemicals, in distilled water, varied with the toxicity of the compound. An attempt was made to keep the doses of all substances below the usually effective dose.

TABLE 2.—*Experiment 3. Phenanthrene derivatives mixed with (a) colchicine, and (b) bacterial filtrates and tested in ABC mice bearing transplanted dermal S-37 tumors*

Phenanthrene derivatives tested	Phenanthrene derivative mixed with—			Number of mice used in tests
	Colchicine	*B. prodigiosus* filtrate organisms grown in synthetic medium	*B. prodigiosus* filtrate organisms grown in broth	
	Percent of regressions of tumors in 3 weeks			
T-1	0	0	6	45
T-2	0	0	25	40
T-3	15	46	30	39
T-4	16	15	30	38
T-5	20	13	21	44
T-6	0	20	0	30
T-7	22	0	0	27
T-8	0	0	0	27
T-9	0	0	0	40
T-10	11	11	0	27
T-11	0	0	0	27
T-12	0	0	10	28
T-13	44	22	0	29

A given phenanthrene compound was mixed (1) in high concentration of colchicine and low concentration of the compound, (2) in low concentration of colchicine and high concentration of the compound, and (3) medium concentrations of both. Similar mixtures were made with each of the filtrates. These mixtures were injected intraperitoneally and 27 or more mice were tested with each phenanthrene derivative. The phenanthrene derivatives in this experiment which were associated with tumor regressions were, generally speaking, the same chemicals which had been similarly effective in experiment 1.

EXPERIMENT 4. COMBINATIONS OF COMPOUNDS

Mixtures of the compounds were made in an attempt to increase the tumor regression rate. For example, 50 percent regressions of tumors had followed the use of T-4 in experiment 1; 30 percent of regressions had followed the use of T-5.

The tests were made in ABC mice bearing 6-day-old transplanted S-37 tumors. Equal parts of a solution or suspension of 0.1 gm. of each chemical in 10 cc. of distilled water were injected intraperitoneally in varying doses from 0.5 cc. to 0.025 cc.

The mixtures, as tested, did not enhance the activity of the individual compounds.

FIGURE 1.—Regressions of sarcoma 37 in strain ABC mice following treatment by phenanthrene derivatives.

TABLE 3.—*Experiment 4. Combinations of phenanthrene derivatives tested in ABC mice bearing transplanted S–37 tumors*

Mixtures of compounds	Number of mice tested	Condition of the tumors in 3 weeks		
		Percent regressions of tumors (mice living)	Mice living or dead	
			Percent of tumors smaller	Percent of tumors growing
T-4, T-15, T-23 mixed	14	0	0	100
T-4, T-15, T-25 mixed	14	7	7	86
T-4, T-15, T-35 mixed	14	9	18	73

EXPERIMENT 5. MIXTURES OF LIKELY PHENANTHRENE COMPOUNDS WITH (A) THEELIN IN OIL AND (B) CHOLESTEROL

Both estrin and cholesterol contain a phenanthrene nucleus; both are biologically formed substances. Tested separately in mice, they caused no regressions in dermal sarcomas. They were mixed with several phenanthrene derivatives which had caused tumor regression in previous tests. The phenanthrene derivatives were suspended or dissolved, 100 mg. per 10 cc., in distilled water, the estrin was dissolved in peanut oil, and the cholesterol, 50 mg., was added to 3 cc. of olive oil. Equal parts were mixed and shaken in a mechanical shaker for 20 minutes prior to injection. The injections, 0.5 cc. of the mixtures, were made intraperitoneally into ABC mice bearing 6-day-old transplanted dermal tumors.

TABLE 4.—*Experiment 5. Combinations of phenanthrene derivatives with estrin and cholesterol tested in ABC mice bearing S–37 tumors*

Mixture injected	Number of mice tested	Condition of tumors in 3 weeks		
		Percent of tumors regressed (mice living)	Mice living or dead	
			Percent of tumors smaller	Percent of tumors growing
T-4, T-15, T-23, and estrin	15	0	0	100
T-4 and estrin	15	0	0	100
T-8 and estrin	15	6	13	81
T-15 and estrin	15	33	0	67
T-23 and estrin	14	21	21	58
T-4, T-15, and estrin	14	7	0	93
T-4, T-15, T-23, estrin and cholesterol	15	0	6	94
T-4 and cholesterol	14	0	0	100
T-35 and cholesterol	16	18	[1]50	32
T-18, estrin, and cholesterol	17	5	15	80
T-4, T-15, T-23, estrin, and cholesterol	17	5	0	95

[1] 30 percent in this group died in 17 days.

Certain compounds, such as T-4, were less effective in these combinations than they were when tested singly, while T-35 appeared to

have an increased deleterious effect on this type of tumor. This test was made in order to determine what effects biologically formed substances would have on the actions of the phenanthrene derivatives.

EXPERIMENT 6. PHENANTHRENE DERIVATIVES TESTED (ONE DOSE) IN FEMALE C_3H MICE BEARING SPONTANEOUS MAMMARY TUMORS

The mice used in this experiment were C_3H female mice, 9 months old, raised in this laboratory by Dr. Andervont. Each mouse bore one or more spontaneous mammary tumors. The chemicals tested were T-3, T-4, T-15, T-16, T-17, T-18, T-21, T-22, T-24, T-37, and T-43. One-tenth of a gram of the chemical was dissolved or suspended in 10 cc. of distilled water. One-half a cc. of the resulting solution or suspension was injected (one dose) subcutaneously, at a distance from the tumor. Eleven phenanthrene compounds were tested in 46 mice bearing spontaneous mammary tumors. No regressions of tumors resulted.

EXPERIMENT 7. PHENANTHRENE DERIVATIVES TESTED (DAILY DOSES) IN FEMALE C_3H MICE BEARING SPONTANEOUS MAMMARY TUMORS

The mice and the materials were of the same kind as those used in experiment 6. In this test, however, daily doses of the chemicals were administered, 0.1 cc. of a solution or suspension containing 100 mg. in 10 cc. of distilled water. The injections were made subcutaneously at a distance from the tumors. The daily injections were continued for 13 days. T-4, T-8, T-17, and T-18 were tested in a total of 16 C_3H mice bearing spontaneous mammary tumors. None of the tumors regressed as a result of treatment.

TABLE 5.—*Comparison of activity of 10 phenanthrene derivatives in 4 tests*

Test material	Percent of regressions of 6-day-old transplanted dermal sarcomas in ABC mice in 3 weeks				Total mice used in 4 tests (573)
	Phenanthrene compounds mixed with—				
	Distilled water	Colchicine	*B. prodigiosus* organisms grown in synthetic culture medium	Berkefeld filtrates organisms grown in broth	
T-1	6	0	0	6	60
T-2	6	0	0	25	64
T-3	33	15	46	30	51
T-4	50	16	15	30	50
T-5	13	20	13	21	85
T-6	4	0	20	0	51
T-7	7	22	0	0	43
T-8	20	[1] 0	[2] 0	[3] 0	52
T-9	5	0	0	0	65
T-10	8	11	11	0	52

[1] 22 percent smaller.
[2] 33 percent smaller.
[3] 40 percent smaller.

A higher rate of regressions of transplanted tumors followed the use of certain phenanthrene derivatives than of others.

Although there is some evidence that substituents such as the carbonyl and amine groups in the 3- or the 9-position of the phenanthrene nucleus may be more active than others, no definite conclusions have yet been reached.

In a general way these results parallel the work of others in that transplanted tumors are more readily affected by chemical compounds than are spontaneous cancers (*7*).

SUMMARY

Seventy-five phenanthrene derivatives, the graphic chemical formulas of which resemble that of colchicine insofar as most of them contained a phenanthrene nucleus, were tested empirically in 1,841 mice bearing transplanted sarcomas and 62 mice bearing spontaneous carcinomas. Most of the compounds were new; 46 of them had never been tested pharmacologically In mice bearing transplanted tumors, the tumor regression rate ranged from none to 50 percent. No regressions occurred in the mice bearing spontaneous tumors. No findings were made that can, as yet, be applied to the treatment of cancer in human beings.

Activity has not, as yet, been satisfactorily associated with any specific chemical grouping.

Some evidence is presented that a given chemotherapeutic agent may affect spontaneous carcinomas and transplanted sarcomas differently.

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NEW LOW MORTALITY RATES FOR 1938

According to the latest provisional figures issued by the Bureau of the Census,[1] both the general mortality rate and the infant mortality rate for the United States reached new low levels in 1938. The provisional crude death rate for that year was 10.6 per 1,000 population and the infant mortality rate is given as 50.9 per 1,000 live births. Both of these rates are the lowest ever recorded in the respective registration areas of continental United States and no doubt represent the lowest for the country as a whole. For several earlier years these registration areas were not coextensive with the United States. The death registration area was established in 1900 and the birth registration area in 1915, and neither area included all States until 1933. The District of Columbia is included in both areas.

The nearest approach to the general mortality rate for 1938 was the rate of 10.7, in 1933, and the next lowest recorded infant mortality rate was 54.4, in 1937. The latter rate has been decreasing steadily, almost continuously, for two decades. In 1915, the year in which the birth registration area was established, the rate was 99.9 for that area, that is, one out of ten babies born died before reaching one year of age. In 1938 this rate had been cut in half, and in that year only one in twenty babies died before reaching the first birth anniversary.

The highest general mortality rate for any State in 1938 was 14.5 per 1,000, and the lowest 7.4. These rates may be compared with the rate of 17.6 for the death registration area in 1900. The highest infant mortality rate for a State in 1938 was 108.8, and the lowest 36.1. While various factors are involved in determining these rates,

[1] Vital Statistics—Special Reports, Vol. 7, Nos. 47 and 48, pp. 451-463.

such as population characteristics, climate, migration, and others, some of which are not amenable to control by health authorities, the infant mortality is considered one of the excellent criteria for evaluating health work. The maximum and minimum infant death rates for the United States for 1938, and the low rates for certain other countries, Australia, for example, where the rate has been around 40 or lower for several years, emphasize the fact that the saving of infant lives has not yet reached the maximum of efficiency in public health work in this country.

While the factors involved in achieving a new minimum death rate cannot be evaluated without a more detailed analysis of specific rates, there can be little doubt that the expansion of the public health program, improved State and local health services, and intensive public health efforts directed against specific diseases have contributed a large share. For this reason alone there should be no retrenchment in public health activities, but, rather, increased effort; not only should the high level of public health so far achieved be maintained, but it should be further improved wherever possible by intensified attacks on specific diseases and specific health problems, and by the extension of public health protection and provision of medical care to all. For it must be remembered that the general death rate does not present the complete health picture. Hidden in that rate are specific causes of death which increased public health effort can still materially reduce, long periods of illness and disability resulting from diseases with low death rates, such as malaria, and the untold suffering, crippling effects, and cost of institutional care incident to syphilis, the enormity and seriousness of which are buried under terminal or contributory causes of death.

DEATHS DURING WEEK ENDED JUNE 24, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 24, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,454	7,455
Average for 3 prior years	[1] 7,619	
Total deaths, first 25 weeks of year	221,987	214,228
Deaths under 1 year of age	452	455
Average for 3 prior years	[1] 510	
Deaths under 1 year of age, first 25 weeks of year	13,050	13,292
Data from industrial insurance companies:		
Policies in force	67,201,091	69,280,198
Number of death claims	12,204	11,718
Death claims per 1,000 policies in force, annual rate	9.5	8.8
Death claims per 1,000 policies, first 25 weeks of year, annual rate	11.2	9.7

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 1, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38 median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median
NEW ENG.												
Maine	6	1	0	0	6	1	------	------	308	51	81	81
New Hampshire	0	0	0	0	------	------	------	------	132	13	17	26
Vermont	0	0	0	1	------	------	------	------	2,118	158	56	35
Massachusetts	5	4	0	5	------	------	------	------	593	504	460	460
Rhode Island	0	0	2	1	------	------	------	------	458	60	1	20
Connecticut	3	1	0	3	------	------	5	1	700	236	26	49
MID. ATL.												
New York [1]	4	10	17	31	[2] 1	[2] 1	[2] 2	[2] 3	348	869	1,986	1,476
New Jersey [1]	6	5	4	10	------	------	2	3	32	27	232	366
Pennsylvania [1] [3]	4	7	22	25	------	------	------	------	43	85	1,010	1,010
E. NO. CEN.												
Ohio [1]	17	22	23	20	5	7	------	9	45	58	540	971
Indiana	13	9	6	7	18	12	------	8	15	10	44	54
Illinois	16	24	20	37	1	2	7	11	18	28	182	490
Michigan [3]	10	9	5	7	1	1	------	------	171	162	1,006	218
Wisconsin	2	1	2	2	12	7	20	14	550	313	1,245	1,178
W. NO. CEN.												
Minnesota	10	5	3	3	2	1	------	------	200	103	149	63
Iowa [1]	14	7	0	2	4	2	------	------	130	64	165	41
Missouri	8	6	1	15	------	------	------	8	23	18	18	80
North Dakota	7	1	5	1	------	------	8	------	66	9	39	11
South Dakota	0	0	1	1	------	------	------	------	173	23	0	0
Nebraska	0	0	1	1	------	------	------	------	42	11	35	21
Kansas	6	2	1	5	------	------	------	1	56	20	67	67
SO. ATL.												
Delaware	0	0	0	0	------	------	------	------	39	2	4	9
Maryland [1] [3]	3	1	6	5	------	------	------	1	145	47	39	79
Dist. of Col. [1]	32	4	2	5	------	------	------	------	622	77	19	19
Virginia	9	5	3	6	26	14	------	------	216	115	126	126
West Virginia	13	5	4	7	19	7	6	11	40	15	87	87
North Carolina [1] [4]	6	4	15	9	------	------	5	5	254	174	330	134
South Carolina [4]	16	6	2	3	311	114	83	59	25	9	74	18
Georgia [4]	15	9	4	5	184	111	------	------	27	16	0	0
Florida [4]	15	5	7	2	------	------	------	1	54	18	48	8
E. SO. CEN.												
Kentucky	5	3	3	3	16	9	9	2	3	2	71	71
Tennessee [1]	2	1	9	3	4	2	4	4	12	7	32	32
Alabama [4]	5	3	3	8	9	5	16	10	83	47	62	49
Mississippi [3]	20	8	4	5	------	------	------	------	------	------	------	------

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 1, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38 median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median
W. SO. CEN.												
Arkansas	5	2	3	4	15	6	11	3	20	8	56	8
Louisiana [4]	10	4	5	6	10	4	7	7	44	18	11	5
Oklahoma	10	5	7	4	18	9	24	19	70	35	30	21
Texas [4]	9	11	16	20	27	32	113	59	105	127	49	100
MOUNTAIN												
Montana [1]	0	0	1	2	28	3	------	2	487	52	49	4
Idaho [1]	20	2	0	0	------	------	2	1	173	17	2	4
Wyoming [1]	0	0	0	0	------	------	------	------	720	33	2	2
Colorado [3]	120	25	13	10	39	8	------	------	197	41	48	49
New Mexico	12	1	1	1	12	1	4	1	185	15	18	23
Arizona	25	2	4	2	294	24	9	2	98	8	12	12
Utah [1 3]	0	0	0	0	10	1	------	------	338	34	180	6
PACIFIC												
Washington	0	0	0	0	------	------	------	------	1,665	540	15	124
Oregon [1]	10	2	4	1	50	10	10	10	298	60	40	16
California	21	25	16	25	11	13	11	17	645	787	472	515
Total	10	247	245	309	19	407	358	336	207	5,126	9,235	9,235
26 weeks	16	10,227	12,185	13,098	271	149,475	43,690	102,317	520	334,515	739,432	644,786

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	6	1	0	0	84	14	9	11
New Hampshire	0	0	0	0	0	0	0	0	0	0	0	3
Vermont	0	0	0	0	0	0	0	0	54	4	3	4
Massachusetts	0	0	0	2	1.2	1	0	1	71	60	130	130
Rhode Island	0	0	0	0	0	0	0	0	53	7	5	10
Connecticut	0	0	0	0	0	0	0	0	42	14	24	24
MID. ATL.												
New York [1]	1.2	3	6	6	1.2	3	2	3	62	154	226	292
New Jersey [1]	1.2	1	0	1	0	0	0	2	69	58	29	61
Pennsylvania [1 3]	4	8	4	5	0	0	0	1	28	55	286	253
E. NO. CEN.												
Ohio [1]	1.5	2	1	2	0.8	1	1	1	124	161	116	152
Indiana	0	0	2	1	0	0	0	0	39	26	17	41
Illinois	0.7	1	1	7	1.3	2	4	3	61	93	154	209
Michigan [3]	0	0	0	2	2.1	2	0	1	157	149	126	196
Wisconsin	7	4	2	2	0	0	0	0	79	45	60	173
W. NO. CEN.												
Minnesota	0	0	0	1	0	0	0	0	37	19	27	49
Iowa [1]	4	2	0	1	0	0	1	0	34	17	15	31
Missouri	1.8	1	3	2	0	0	0	0	35	27	16	25
North Dakota	7	1	0	0	0	0	1	0	15	2	2	5
South Dakota	8	1	0	0	0	0	1	0	113	15	5	5
Nebraska	4	1	0	0	0	0	0	0	11	3	16	10
Kansas	0	0	0	0	0	0	0	1	95	34	20	23

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 1, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	59	3	3	2
Maryland [1] [3]	0	0	1	1	0	0	0	0	19	6	19	19
Dist. of Col [1]	0	0	0	0	0	0	0	0	16	2	8	6
Virginia	1.9	1	5	4	0	0	2	1	6	3	4	10
West Virginia	0	0	1	2	0	0	0	0	32	12	13	18
North Carolina [1] [4]	4	3	0	3	4	3	2	2	18	12	16	14
South Carolina [4]	0	0	1	0	79	29	0	1	14	5	1	1
Georgia [4]	0	0	0	0	7	4	3	1	18	11	5	5
Florida [4]	0	0	0	0	0	0	1	1	6	2	0	1
E. SO. CEN.												
Kentucky	1.7	1	6	5	0	0	1	1	26	15	8	12
Tennessee [1]	0	0	0	2	1.8	1	1	1	21	12	6	5
Alabama [4]	0	0	4	2	1.8	1	5	5	26	15	7	4
Mississippi [3]	0	0	0	0	0	0	3	2	3	1	2	5
W. SO. CEN.												
Arkansas	2.5	1	0	0	2.5	1	0	0	5	2	2	2
Louisiana [4]	0	0	1	1	0	0	3	3	12	5	6	6
Oklahoma	0	0	1	0	2	1	0	0	18	9	7	7
Texas [4]	0.8	1	0	0	7	9	1	2	15	18	42	32
MOUNTAIN												
Montana [1]	0	0	0	0	9	1	0	0	19	2	4	9
Idaho [1]	0	0	0	0	0	0	0	0	20	2	0	2
Wyoming [1]	0	0	0	0	0	0	0	0	131	6	7	7
Colorado [5]	0	0	0	0	5	1	0	0	217	45	17	13
New Mexico	12	1	0	0	12	1	0	0	124	10	6	6
Arizona	0	0	1	1	12	1	0	0	110	9	3	7
Utah [1] [3]	0	0	0	0	10	1	0	0	40	4	17	11
PACIFIC												
Washington	0	0	0	1	0	0	0	1	19	6	11	19
Oregon	0	0	0	0	0	0	0	0	30	6	20	20
California	0.8	1	1	5	18	16	1	7	80	97	97	113
Total	1.4	34	41	61	3	80	83	158	51	1,277	1,617	2,228
26 weeks	1.8	1,173	1,898	3,630	1.2	793	547	815	170	110,798	130,360	157,273

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	0	1	229	38	46
New Hampshire	0	0	0	0	0	0	1	0	0	0	0
Vermont	0	0	0	0	0	0	1	0	590	44	26
Massachusetts	0	0	0	0	2	2	0	0	120	102	79
Rhode Island	0	0	0	0	0	0	0	0	137	18	13
Connecticut	18	6	0	0	6	2	2	1	217	73	101
MID. ATL.											
New York [1]	0	0	0	0	4	11	5	11	159	390	472
New Jersey [1]	0	0	0	0	5	4	4	3	356	299	161
Pennsylvania [1] [3]	0	0	0	0	3	5	25	17	160	316	332

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 1, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases	1934–38, median	July 1, 1939, rate	July 1, 1939, cases	July 2, 1938, cases
E. NO. CEN.											
Ohio [1]	5	7	1	0	5	6	8	8	257	334	213
Indiana	10	7	19	3	4	3	2	5	119	80	13
Illinois	9	14	21	21	6	9	16	16	198	302	245
Michigan [3]	2	2	0	0	3	3	3	4	220	208	287
Wisconsin	2	1	2	6	4	2	0	0	301	171	207
W. NO. CEN.											
Minnesota	6	3	23	7	6	3	0	0	68	35	25
Iowa [1]	24	12	12	12	12	6	0	1	101	50	19
Missouri	17	13	17	10	17	13	3	18	80	62	30
North Dakota	0	0	3	3	0	0	0	0	51	7	19
South Dakota	53	7	4	4	0	0	0	0	30	4	6
Nebraska	4	1	0	2	0	0	0	0	19	5	9
Kansas	0	0	7	7	14	5	0	6	39	14	110
SO. ATL.											
Delaware	0	0	0	0	39	2	3	1	59	3	11
Maryland [1] [3]	0	0	0	0	3	1	3	4	176	57	56
Dist. of Col.[1]	0	0	0	0	0	0	0	0	234	29	5
Virginia	0	0	0	0	22	12	7	8	75	40	54
West Virginia	0	0	0	0	30	11	6	6	56	21	77
North Carolina [1] [4]	0	0	0	0	12	8	20	20	370	253	356
South Carolina [4]	3	1	0	0	44	16	22	20	120	44	84
Georgia [4]	0	0	0	0	50	30	25	34	46	28	44
Florida [4]	0	0	0	0	6	2	2	4	21	7	17
E. SO. CEN.											
Kentucky	0	0	0	0	21	12	18	18	19	11	46
Tennessee [1]	4	2	1	1	26	15	11	27	183	104	45
Alabama [4]	0	0	0	0	12	7	14	17	97	55	51
Mississippi [3]	0	0	3	0	18	7	15	16	-------	-------	-------
W. SO. CEN.											
Arkansas	7	3	1	0	32	13	17	17	35	14	37
Louisiana [4]	0	0	0	0	53	22	21	21	15	6	43
Oklahoma	12	6	8	1	48	24	10	9	8	4	25
Texas [4]	4	5	13	2	17	21	53	35	161	194	258
MOUNTAIN											
Montana [1]	9	1	1	2	0	0	1	1	84	9	52
Idaho [1]	0	0	13	3	51	5	3	2	61	6	5
Wyoming [1]	44	2	0	1	0	0	0	0	44	2	16
Colorado [5]	0	0	0	0	0	0	2	2	149	31	32
New Mexico	0	0	4	1	86	7	9	7	222	18	15
Arizona	25	2	2	0	25	2	9	4	319	26	0
Utah [1] [3]	60	6	0	0	20	2	1	0	685	69	96
PACIFIC											
Washington	0	0	3	3	3	1	3	3	22	7	66
Oregon [1]	0	0	7	5	0	0	4	4	134	27	26
California	6	7	22	2	7	8	10	10	103	126	206
Total	4	108	187	152	12	305	359	421	152	3,749	4,136
26 weeks	13	8,272	11,937	5,573	6	3,803	4,298	4,298	158	101,777	111,737

[1] Rocky Mountain spotted fever, week ended July 1, 1939, 35 cases as follows: New York, 3; New Jersey, 8; Pennsylvania, 3; Ohio, 2; Iowa, 3; Maryland, 4; District of Columbia, 2; North Carolina, 4; Tennessee, 1; Montana, 1; Idaho, 2; Wyoming, 2; Utah, 3; Oregon, 2.
[2] New York City only.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 1, 1939, 44 cases as follows: North Carolina, 2; South Carolina, 1; Georgia, 17; Florida, 3; Alabama, 13; Louisiana, 2; Texas, 6.
[5] Colorado tick fever, week ended July 1, 1939, Colorado, 4 cases.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
May 1939										
Arizona	0	7	198	8	138	4	10	55	23	7
Hawaii Territory	0	8	23		16		2	2	0	2
New York	20	69		2	9,782		8	2,321	16	28
North Carolina	4	37	30	71	2,708	24	2	71	0	26
Oregon		3	145		312			62	45	11
Virginia	0	32	398	11	3,187	17	0	64	0	11

May 1939	Cases
Chickenpox:	
Arizona	62
Hawaii Territory	156
New York	2,505
North Carolina	435
Oregon	138
Virginia	414
Conjunctivitis, infectious:	
Hawaii Territory	86
Dysentery:	
Arizona	179
Hawaii Territory (amoebic)	1
Hawaii Territory (bacillary)	1
New York (amoebic)	2
New York (bacillary)	85
Virginia (amoebic)	1
Virginia (bacillary)	245
Encephalitis, epidemic or lethargic:	
Hawaii Territory	1
New York	10
Virginia	2
German measles:	
Arizona	4
New York	161
North Carolina	81
Hookworm disease:	
Hawaii Territory	10

May 1939	Cases
Impetigo contagiosa:	
Hawaii Territory	21
Oregon	24
Leprosy:	
Hawaii Territory	4
Mumps:	
Arizona	55
Hawaii Territory	256
Oregon	100
Virginia	295
Ophthalmia neonatorum:	
New York	19
Rabies in animals:	
New York [1]	7
Oregon	1
Rocky Mountain spotted fever:	
New York	1
Oregon	15
Virginia	3
Scabies:	
Oregon	4
Septic sore throat:	
Hawaii Territory	1
New York	246
North Carolina	8
Virginia	78
Tetanus:	
Hawaii Territory	4
New York	8

May 1939	Cases
Trachoma:	
Arizona	60
Hawaii Territory	1
Trichinosis:	
New York	1
Tularaemia:	
Arizona	2
New York	1
North Carolina	1
Virginia	4
Typhus fever:	
Hawaii Territory	1
New York	2
North Carolina	4
Undulant fever:	
Arizona	4
New York	17
North Carolina	1
Virginia	2
Vincent's infection:	
New York [1]	63
Oregon	7
Whooping cough:	
Arizona	60
Hawaii Territory	635
New York	1,835
North Carolina	1,056
Oregon	47
Virginia	220

[1] Exclusive of New York City.

PLAGUE INFECTION IN IDAHO AND OREGON

Under date of June 28, 1939, Senior Surg. C. R. Eskey reported plague infection found in Idaho and Oregon as follows:

IN FLEAS FROM GROUND SQUIRRELS IN FREMONT COUNTY, IDAHO

In a pool of 207 fleas from 167 ground squirrels, *C. armatus*, shot June 14 at a location 20 miles northwest of Macks Inn.

IN GROUND SQUIRRELS AND FLEAS FROM GROUND SQUIRRELS IN WALLOWA COUNTY, OREG.

In tissue from 2 ground squirrels, *C. columbianus*, proved separately, shot June 4, 1939, on a ranch 29 miles northeast of Enterprise, and in a pool of 20 fleas from 3 ground squirrels of the same species shot at the same time on the same ranch.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 24, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	136	40	18	3,420	384	1,086	12	379	49	1,280	-------
Current week [1]	78	33	16	1,869	250	584	5	320	28	1,260	-------
Maine:											
Portland	0	------	0	1	0	0	0	1	0	17	13
New Hampshire:											
Concord	------	------	------	------	------	------	------	------	------	------	------
Manchester	0	------	0	0	0	0	0	0	0	0	6
Nashua	0	------	0	1	0	0	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	1	2
Burlington	0	------	0	14	0	0	0	0	0	1	10
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	142	11	33	0	6	1	29	195
Fall River	0	------	0	0	2	0	0	0	0	2	21
Springfield	0	------	0	9	2	2	0	0	0	0	33
Worcester	0	------	0	19	7	2	0	2	0	16	49
Rhode Island.											
Pawtucket	0	------	0	8	2	1	0	0	0	0	16
Providence	1	------	0	69	1	5	0	2	1	41	64
Connecticut:											
Bridgeport	0	------	0	12	1	4	0	0	0	0	23
Hartford	0	------	0	7	2	5	0	5	0	8	35
New Haven	0	2	0	121	3	0	0	1	1	6	44
New York:											
Buffalo	1	------	0	50	9	18	0	7	0	17	148
New York	15	4	1	158	39	83	0	72	5	104	1,270
Rochester	0	2	0	70	0	10	0	1	2	2	50
Syracuse	0	------	0	56	3	9	0	1	0	29	44
New Jersey											
Camden	1	------	0	0	2	0	0	1	1	8	23
Newark	0	------	0	1	2	9	0	4	0	48	89
Trenton	0	------	0	1	2	5	0	5	0	0	41
Pennsylvania:											
Philadelphia	1	------	0	59	8	22	0	14	6	140	386
Pittsburgh	1	------	1	5	7	19	0	2	0	49	138
Reading	1	------	0	6	0	0	0	0	0	0	9
Scranton	0	------	------	1	------	3	0	------	0	0	------
Ohio:											
Cincinnati	2	------	0	0	1	12	0	5	0	11	114
Cleveland	1	2	0	2	8	19	0	8	0	65	162
Columbus	0	------	0	8	2	1	0	1	0	1	81
Toledo	0	1	0	19	2	3	1	1	0	37	53
Indiana:											
Anderson	0	------	0	0	0	1	1	0	0	1	4
Fort Wayne	------	------	------	------	------	------	------	------	------	------	------
Indianapolis	0	------	1	2	3	9	0	2	0	42	83
Muncie	0	------	0	0	0	0	0	0	0	0	6
South Bend	0	------	0	1	0	1	0	0	0	10	13
Terre Haute	0	------	0	0	1	0	0	0	0	0	11
Illinois:											
Alton	1	------	0	0	0	0	0	1	0	0	12
Chicago	12	2	0	8	11	99	0	43	0	88	592
Elgin	0	------	0	0	0	0	0	0	0	4	9
Moline	0	------	0	0	0	1	0	0	0	1	16
Springfield	0	------	0	0	1	0	0	0	0	3	17
Michigan:											
Detroit	3	------	1	49	8	60	0	15	0	76	219
Flint	0	------	0	17	2	3	0	0	0	1	32
Grand Rapids	0	------	0	1	0	18	0	0	1	1	26
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	4	3
Madison	0	------	0	68	2	0	0	0	1	16	9
Milwaukee	0	1	1	1	1	16	0	2	0	26	92
Racine	0	------	0	0	0	1	0	0	0	5	6
Superior	0	------	0	9	0	1	0	0	0	0	8

[1] Figures for Concord, Fort Wayne, and St. Joseph estimated; reports not received.

City reports for week ended June 24, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0		0	2	0	3	0	0	0	3	20
Minneapolis	0		0	11	2	7	0	2	0	7	96
St. Paul	0		0	6	0	1	0	3	0	6	61
Iowa:											
Cedar Rapids	0			9		0	0		0	0	
Davenport	1			0		2	0		0	1	
Des Moines	0		0	1	0	2	0	0	0	2	37
Sioux City	0			3		2	0		0	0	
Waterloo	1			1		1	0		0	4	
Missouri:											
Kansas City	1		0	2	2	3	0	4	0	3	89
St. Joseph											
St. Louis	0		0	2	10	14	0	7	1	22	198
North Dakota:											
Fargo	0		0	1	1	1	0	0	0	0	8
Grand Forks	0			0		1	0		0	0	
South Dakota:											
Aberdeen	0			3		0	0		0	0	
Sioux Falls	0		0	0	0	2	0	0	0	0	9
Nebraska:											
Lincoln	0			2		2	0		0	19	
Omaha	0		0	5	5	0	3	2	0	3	55
Kansas:											
Lawrence	0		0	1	0	0	0	0	0	1	3
Topeka	0	2	2	2	1	2	0	0	0	0	13
Wichita	1		0	17	5	1	1	0	0	2	32
Delaware:											
Wilmington	0		0	7	1	1	0	2	0	1	21
Maryland:											
Baltimore	1		0	32	3	7	0	15	0	60	177
Cumberland	0		0	0	1	0	0	0	0	0	17
Frederick	0		0	0	0	0	0	0	0	0	2
District of Columbia:											
Washington	1	1	1	96	3	5	0	12	0	54	141
Virginia:											
Lynchburg	1		0	17	0	1	0	0	0	44	9
Norfolk	0		0	3	0	0	0	1	0	2	32
Richmond	1		0	80	1	2	0	0	0	2	55
Roanoke	0		0	5	1	0	0	0	0	2	19
West Virginia:											
Charleston	0		0	0	0	0	0	0	0	1	6
Huntington	1			0		0	0		0	0	
Wheeling	0		0	0	1	0	0	0	0	3	17
North Carolina:											
Gastonia	0			0		0	0		0	0	
Raleigh	2		0	0	1	0	0	0	0	6	18
Wilmington	0		0	0	0	0	0	0	1	2	14
Winston-Salem	0		0	1	1	0	0	1	0	0	14
South Carolina:											
Charleston	0	1	0	0	3	0	0	0	0	0	25
Florence	0		0	0	0	0	0	0	0	0	9
Greenville	0		0	0	0	0	0	0	0	0	9
Georgia:											
Atlanta	0	1	1	3	2	0	0	4	0	2	80
Brunswick	0		0	1	0	0	0	0	1	3	5
Savannah	0	2	0	3	1	1	0	2	2	11	25
Florida:											
Miami	0		0	0	3	1	0	0	1	3	20
Tampa	2		0	17	0	2	0	0	0	0	20
Kentucky:											
Ashland	0		0	0	0	0	0	2	0	0	8
Covington	0		0	0	0	0	0	2	0	0	10
Lexington	0		0	0	1	0	0	0	0	0	19
Louisville	0	1	0	2	2	4	0	3	0	17	71
Tennessee:											
Knoxville	0		0	0	0	1	0	0	0	4	20
Memphis	0		1	2	6	2	0	5	0	28	71
Nashville	0		0	1	1	1	0	3	0	8	56
Alabama:											
Birmingham	0	3	0	1	1	1	0	1	0	5	57
Mobile	0		0	0	2	1	0	0	0	0	16
Montgomery	0	1		8		0	0		0	3	
Arkansas:											
Fort Smith	0			0		2	0		0	0	
Little Rock	0		1	0	5	0	0	2	0	0	10

City reports for week ended June 24, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0		0	0	1	0	0	1	0	0	12
New Orleans	3	1	1	9	8	3	0	5	0	33	139
Shreveport	0		0	0	2	0	0	2	0	0	38
Oklahoma:											
Oklahoma City	0		0	7	1	0	0	1	0	0	31
Texas:											
Dallas	1		0	5	0	4	0	3	1	3	53
Fort Worth	1		0	1	2	2	0	0	0	0	39
Galveston	0		0	0	0	1	0	0	1	1	15
Houston	2		0	3	10	0	0	6	1	1	102
San Antonio	1		0	2	6	0	0	5	0	0	84
Montana:											
Billings	0		0	0	2	0	0	0	0	0	6
Great Falls	0		0	25	1	0	0	0	0	0	13
Helena	0		0	1	0	0	0	0	0	0	3
Missoula	0		0	0	1	0	0	1	0	0	8
Idaho:											
Boise	0		0	1	2	0	0	0	0	0	7
Colorado:											
Colorado Springs	0		0	0	3	8	0	2	0	0	12
Denver	9		0	25	4	10	0	4	2	23	71
Pueblo	0		0	3	1	1	0	0	0	8	7
New Mexico:											
Albuquerque	0		0	0	1	2	0	1	0	0	11
Utah:											
Salt Lake City	0		0	6	0	2	0	0	0	16	21
Washington:											
Seattle	0		0	314	1	4	0	4	0	7	94
Spokane	0		0	28	0	1	0	1	0	0	25
Tacoma	0		1	9	1	2	0	0	0	0	24
Oregon.											
Portland	0	1	0	4	2	2	0	1	0	2	65
Salem	0			0		0	0		0	0	
California:											
Los Angeles	9	9	0	209	5	22	0	14	0	31	291
Sacramento	1		0	27	0	3	0	0	0	2	22
San Francisco	3		0	4	5	5	0	9	0	7	189

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				South Carolina:			
Worcester	1	0	0	Charleston	0	0	6
New York:				Georgia:			
New York	0	0	1	Atlanta	0	0	1
Pennsylvania:				Florida:			
Scranton	1	0	0	Miami	0	0	1
Indiana:				Alabama:			
Indianapolis	0	0	1	Birmingham	1	0	0
Illinois:				Arkansas:			
Chicago	1	0	0	Little Rock	0	0	1
Minnesota:				Louisiana:			
Minneapolis	1	0	0	Shreveport	0	1	0
St. Paul	0	0	1	Texas:			
Missouri:				Dallas	0	0	1
St. Louis	1	1	0	Houston	1	0	0
Nebraska:				Colorado:			
Omaha	0	0	1	Denver	0	0	2
Maryland:				California:			
Baltimore	1	0	0	Los Angeles	0	0	6
Virginia:							
Richmond	1	0	0				

Pellagra.—Cases: Philadelphia, 1; Winston-Salem, 1; Savannah, 8; Memphis, 1.
Typhus fever.—Cases: Savannah, 1; Tampa, 1; Mobile, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended June 10, 1939.—During the week ended June 10, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2		1				3
Chickenpox		5	2	141	274	47	15	9	36	529
Diphtheria		1		53	2	4	1	1	1	63
Dysentery					2					2
Influenza		42			15		7		231	295
Lethargic encephalitis							1			1
Measles		16	1	639	1,229	6		19	24	1,934
Mumps				25	57	20		2	10	114
Pneumonia		8			12			1	5	26
Poliomyelitis						1				1
Scarlet fever	2	10	32	95	112	11	7	21	9	299
Tuberculosis	1	11	29	108	56	4	17	2		228
Typhoid and paratyphoid fever				11	3	2	1	1		18
Whooping cough		16		64	98	185	18	2	63	446

FINLAND

Communicable diseases—May 1939.—During the month of May 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	176	Poliomyelitis	9
Influenza	4,220	Scarlet fever	749
Paratyphoid fever	42	Typhoid fever	6

SWITZERLAND

Communicable diseases—April 1939.—During the month of April 1939, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	8	Paratyphoid fever	6
Chickenpox	74	Poliomyelitis	1
Diphtheria and croup	33	Scarlet fever	287
German measles	15	Tuberculosis	235
Influenza	34	Typhoid fever	3
Lethargic encephalitis	1	Undulant fever	15
Measles	18	Whooping cough	77
Mumps	111		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for June 30, 1939, pages 1182–1194. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Afghanistan—Kandahar Province—Greshk.—During the week ended July 1, 1939, 5 cases of cholera were reported in Greshk, Kandahar Province, Afghanistan.

China.—According to information dated June 28, 1939, 5 new cases of cholera were reported in Canton and vicinity between June 15 and 23, 1939. The report also states that, according to Japanese authorities, 548 cases of cholera with 272 deaths have occurred in the occupied area near Canton up to June 15, 1939. During the week ended June 24, 1939, 50 cases of cholera were reported in Hong Kong, China.

Plague

India—Rangoon.—During the week ended June 24, 1939, one case of plague was reported in Rangoon, India.

United States.—A report of plague infection in Fremont County, Idaho, and Wallowa County, Oreg., appears on page 1294 of this issue of the PUBLIC HEALTH REPORTS.

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Public Health Reports

VOLUME 54 JULY 21, 1939 NUMBER 29

IN THIS ISSUE

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PREVALENCE OF POLIOMYELITIS

According to reports received from the State health authorities, a total of 143 cases of poliomyelitis was reported in the United States for the week ended July 15, 1939, as compared with 84 cases for the preceding week and with a 5-year median for the current week of 191 cases. Although a considerable increase is shown for the current week, the number of cases reported was only about 75 percent of the expectancy based on the median for the 5 preceding years.

There was no change in the situation in South Carolina, where 20 cases were reported (the same as for the preceding week), while North Carolina, Georgia, and Florida showed decreases. The number of cases in the East North Central States increased from 4 to 18, and in the West North Central group from none to 10. Nineteen States reported no cases. California reported 45 cases, as compared with 18 for the week ended July 8, but of these cases Los Angeles reported only 5 and San Francisco 1. Information regarding the distribution of the cases by other localities is not available.

DISABLING MORBIDITY AMONG EMPLOYEES IN THE SOAP INDUSTRY, 1930-34,[1] INCLUSIVE

By HUGH P. BRINTON, *Associate Statistician* and HARRY E. SEIFERT, *Assistant Public Health Engineer, United States Public Health Service*

The present report dealing with sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer among workers in the soap industry covers the period 1930–34 and is derived from data transcribed from the sick benefit organization records of 10,833 members who were employed in 36 establishments. The basic data with respect to months of membership, cases and days of dis-

[1] From the Division of Industrial Hygiene, National Institute of Health, Washington, D. C. The supporting data of this report for the period January 1, 1930, to December 31, 1934, are drawn from material collected by the Occupational Morbidity and Mortality Study of the National Health Survey. The study was made possible by a grant from the Works Progress Administration in 1935. Bibliographic information concerning the reports prepared thus far is included in the list of references (*1–6*).

Readers interested in a description of soap making, useful in determining, among other things, the duties connected with the different occupations may consult reference 7.

Acknowledgment is made to Dr. W. M. Gafafer for his assistance in the preparation of this paper.

ability, and deaths are summarized in the following table. It will be observed that the months of membership total 389,399. On the basis of continuous membership during the entire study period of 60 months, this would mean that there were at least 6,490 employees, but actually there were 10,833 employees, which results in an average membership of 36 months instead of 60 for the 5 years. Since the months of membership for the employees other than white are too small to be used for statistical purposes, the analysis will be based on the experience of white males and females.

Color and sex	Number of months of membership	Number of cases of disability	Number of days of disability	Number of deaths
Total	389,399	2,565	90,772	89
White:				
Male	336,015	2,129	75,490	84
Female	52,499	429	14,935	5
Colored:				
Male	668	7	256	
Unknown	217		91	

Limitations of the data.—Membership in the sick benefit organization is compulsory, but excludes employees with initial salaries of $3,600 per year or over. There are no age limits for applicants for membership, but a physical examination is required. Benefits are refused for disabilities connected with the improper use of stimulants or narcotics, "immoral practices," venereal diseases, voluntary self-injury, unlawful acts, fighting, and maternity. There is a *waiting period* of 7 days, which means that payments are not made for the first 7 days of disability. Payments amounting to two-thirds of the weekly wages are paid for a *maximum benefit period* of 52 weeks in any one year in the event of one or more disabilities. Thereafter reduced payments are continuous.

The analysis is based on only those disabilities that occurred while a worker was a member of the sick benefit organization and these disabilities, furthermore, must have been eligible for benefits.

Since the various sick benefit organizations furnishing data to the Occupational Morbidity and Mortality Study had waiting periods and maximum benefit periods of different durations, certain principles were set down in order that the data for all organizations would be comparable. Thus, a standard waiting period of 7 days was adopted, since all of the cooperating sick benefit organizations considered in this series of reports have a waiting period of 7 days or less.

With respect to the standardization of the maximum benefit period, on the other hand, disabilities or cases which had a duration of 91 calendar days or longer were arbitrarily terminated at 91 days. Only disabilities which began during the study period and lasted 8 calendar days or longer were considered as cases. Disabilities which began before the study period started and lasted 8 calendar days or longer during the study period were not considered as cases, but all days of disability occurring during the study period were considered as days disabled. Known duration cases are those that began and terminated in recovery or death during the study period. Ended cases for calculating fatality rates consist of all disabilities which terminated either in death or recovery during the study period and disabilities which ended in death before the expiration of the waiting period.

Occupational grouping.—Since the number of months of membership for specific occupations was too small for separate analysis the occupations were arranged

into 11 groups for white male workers and into 3 groups for white female workers, as shown in table 1. For both sexes the group of office workers includes members working in similar environments who are presumably not subjected to the exposures in the plant. Process operators, males only, include mainly semiskilled workers who are engaged in making soap; although a large variety of materials is used, for example, fats, oils, lye, sal soda, glycerine, and other products, normally these workers are not exposed to such materials, since most of the processes are enclosed. The group consisting of soap handlers and process laborers is subjected to strenuous work. Soap handlers prepare the finished soap for the wrappers and packers; process laborers include equipment cleaners, as well as workers who supply the different materials required in processing, and general laborers who assist the process operators. Packing machine operators include both male and female workers who handle the finished soap. Warehouse laborers do strenuous work and are presumably not subjected to exposures in the plant. Laborers (not elsewhere classified) are unskilled workers who are not designated elsewhere in the table. This group is not homogeneous as to the type of work or exposure. Some of these laborers work inside and some outside the plant. The only characteristic which they have in common is the fact that they are unskilled. The remaining occupational groups listed in the table are self-explanatory.

TABLE 1.—*Specific occupations comprising each occupational group*

Occupational group	Specific occupations
	WHITE MALES
Office workers	Accountants, bookkeepers, cashiers, clerks, officials, and stenographers.
Salesmen	Commercial salesmen and sales-promotion men.
Foremen	Foremen in all departments.
Process operators	Amalgamators, crutchers, dryer operators, evaporator operators, filter-press operators, furnace men, hardening-machine operators, plodders, pump operators, refiners, roll operators soap boilers, still operators, and tower operators.
Soap handlers and process laborers (n. e. c.)[1].	Carry-offs, cutters, process laborers (except packing department laborers), pull-outs, setters, slabbers, stampers, and strippers.
Packing-machine operators.	Filling-machine operators, folders, packing-machine operators, sealers, and wrapping-machine operators.
Packing laborers	General laborers in the packing department, machinery cleaners, and truckers.
Warehouse laborers	Car loaders and unloaders, general warehouse laborers, stackers, and truckers.
Maintenance workers	Blacksmiths, carpenters, electricians, machinists, masons, mechanical helpers and laborers, mechanics, millwrights, oilers, painters, pipefitters and helpers, riggers and helpers, tank builders, tinners and helpers, welders and welders' helpers.
Laborers (n. e. c.)[1]	Ashmen, automobile washers, boiler cleaners, coal and coke handlers, and general laborers about plant and yard.
All others	Bakers, coopers and helpers, drivers, laboratory workers, licensed engineers and firemen, office and rest-room janitors, porters, railroad firemen and engineers, truck and tractor drivers, and watchmen.
	WHITE FEMALES
Office workers	Bookkeepers, cashiers, clerks, office machine operators, stenographers and typists, and telephone operators.
Packing-machine operators.	Filling-machine operators, sealers, wrapping- and packing-machine operators.
All others	Foreladies, janitors, laboratory workers, nurses, and restaurant help.

[1] Not elsewhere classified.

ANALYSIS OF THE DATA

Age distribution by occupational group.—For each occupational classification the percentage of workers in each age group, and the months of membership, by age group, are shown in table 2. In addition, are given the percentage distribution by age group for gainful white

male and female workers in the United States and the distribution for gainful male and female workers in the soap industry.

TABLE 2.—*Months of membership by age and sex according to occupational group, white employees in the soap industry, 1930–34, inclusive*

Occupational group	All known ages	Age in years: Under 25	25–34	35–44	45–54	55–64	65 and over
PERCENTAGE DISTRIBUTION							
	Males						
All gainful white workers in the United States [1]	*100.0*	*19.7*	*24.0*	*22.9*	*17.4*	*10.7*	*5.3*
All gainful workers in soap factories in the United States [1]	*100.0*	*22.3*	*27.0*	*22.9*	*16.2*	*8.5*	*3.1*
All occupations, present report	100.0	12.2	40.7	27.8	13.1	5.5	.7
Office workers	100.0	23.1	46.8	20.0	7.7	2.1	.3
Salesmen	100.0	7.6	47.2	33.8	8.9	2.4	.1
Foremen	100.0	5.9	35.8	34.0	16.0	7.1	1.2
Process operators	100.0	8.4	41.2	28.8	16.0	5.2	.4
Soap handlers and process laborers	100.0	8.6	44.2	29.3	13.6	3.3	1.0
Packing-machine operators	100.0	32.7	41.9	16.8	6.2	2.4	([2])
Packing laborers	100.0	17.2	43.9	23.5	10.1	5.0	.3
Warehouse laborers	100.0	8.5	36.4	33.2	17.2	4.4	.3
Maintenance workers	100.0	6.1	34.6	33.0	17.9	7.8	.6
Laborers (n. e. c.)	100.0	10.2	32.5	24.9	19.0	10.9	2.5
All others	100.0	17.6	34.9	20.6	13.9	10.9	2.1
	Females						
All gainful white workers in the United States [1]	*100.0*	*38.5*	*24.4*	*16.9*	*11.5*	*6.2*	*2.5*
All gainful workers in soap factories in the United States [1]	*100.0*	*54.6*	*26.0*	*11.7*	*5.6*	*1.7*	*.4*
All occupations, present report	100.0	42.0	37.9	13.4	5.3	1.4	([2])
Office workers	100.0	40.7	41.5	11.5	4.7	1.6	([2])
Packing-machine operators	100.0	54.0	34.3	9.6	2.1	-------	-------
All others	100.0	18.2	29.7	32.1	16.1	3.9	-------
NUMBER OF MONTHS OF MEMBERSHIP							
	White males						
All occupations, present report	335.550	40,956	136,556	93,345	48,951	18,302	2,440
Office workers	47,254	10,891	22,187	9,471	3,622	970	163
Salesmen	50,872	3,889	23,993	17,212	4,545	1,199	34
Foremen	25,526	1,503	9,131	8,679	4,094	1,818	301
Process operators	38,095	3,194	15,702	10,974	6,071	1,993	161
Soap handlers and process laborers	26,681	2,308	11,788	7,812	3,637	878	258
Packing-machine operators	9,758	3,193	4,092	1,640	601	230	2
Packing laborers	22,951	3,946	10,077	5,397	2,316	1,154	61
Warehouse laborers	12,912	1,092	4,695	4,289	2,223	574	39
Maintenance workers	51,414	3,184	17,772	16,963	9,182	4,026	337
Laborers (n. e. c.)	13,605	1,384	4,422	3,383	2,591	1,488	337
All others	36,482	6,422	12,747	7,525	5,069	3,972	747
	White females						
All occupations, present report	52,470	22,050	19,900	7,032	2,765	717	6
Office workers	30,422	12,376	12,620	3,511	1,435	474	6
Packing-machine operators	15,795	8,534	5,422	1,516	823	-------	-------
All others	6,258	1,140	1,858	2,005	1,007	243	-------

[1] Reference (6).
[2] Less than 0.1 of 1 percent.

Only in the age group 25–34 is the percentage of white male workers in this report (40.7) appreciably greater than the corresponding percentages given for the two other population groups. Summations show that the percentages of the gainful white male workers in the United States, the male workers in the soap industry and the white male workers in this study under 35 years of age are 43.7, 49.3, and 52.9, respectively. It is of interest to observe the percentage age distribution of white male office workers and of white male packing-machine operators. In the former group, 69.9 percent of the workers are under 35 years of age, while the corresponding percentage for the latter group is 74.6; these figures reflect the relatively high percentages of workers under 25 years of age. The two groups with the smallest percentage of workers under 35 years of age are foremen and maintenance workers with 41.7 and 40.7 percent, respectively.

A much larger percentage of female workers than of males are under 25 years of age, the ratio of the percentages being over 3 to 1. The percentages of workers under 35 years of age among all gainful white female workers in the United States, for female workers in the soap industry, and for white females in this study are 62.9, 80.6, and 79.9 percent, respectively. The proportion of workers in each 10-year age group after 34 years is nearly identical for gainful female workers in soap factories and white female workers covered in this report. In the occupational group of packing-machine operators 88.3 percent of the white female workers are under 35 years of age, as compared with 74.6 percent for white male workers.

Frequency of disabilities, by duration.—Table 3 shows by sex for two broad age groups the frequency of cases of disability of different durations. It will be noted that with respect to all durations the difference between the frequencies for the two age groups is very much greater among the males than among the females. Among both sexes, for the shortest durations, 8–14 days, there was a greater frequency among younger than among older persons, but for durations of 15 days and longer the cases in the older age groups showed greater frequencies, with the excess being most marked for the cases with longest duration.

At all ages and for all durations the rate for females was greater than that for males. For both age groups an increase in the length of case tended to make the position of females relatively more unfavorable. The difference between the male rate and the female rate was relatively less for all duration periods among persons aged 35 years and over than among persons under that age.

Selected indexes by age group and sex.—Table 4 gives certain indexes specific for age group and sex. For example, the annual number of cases per 1,000 males is shown to be 68.3 under 25 years of age and

211.5 at 65 years and over. Among males 35 years and over the rate rises with each succeeding age group. For females the small number of person-years of membership for the older age groups is apparently responsible for the irregularity in the trend of the rates.

TABLE 3.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, by sex for the age groups under 35 years and 35 years and over, by known duration in calendar days, white employees in the soap industry, 1930–34, inclusive*

Duration of case in calendar days	Males		Females	
	Under 35 years	35 years and over	Under 35 years	35 years and over
	Annual number of cases per 1,000 persons			
All known durations	65.6	80.9	95.0	97.0
8–14	20.1	18.6	29.7	24.0
15–28	22.6	28.3	29.2	30.8
29–49	11.2	14.0	16.6	17.1
50–91	7.6	11.6	11.2	13.7
92 and over	4.1	8.4	8.3	11.4
	Number of cases of known duration [1]			
All known durations	970	1,065	332	85
8–14	298	245	104	21
15–28	334	372	102	27
29–49	165	184	58	15
50–91	112	153	39	12
92 and over	61	111	29	10
Number of person-years of membership	14,792.7	13,169.8	3,495.8	876.7

[1] Cases with onset during 1930–34, inclusive.

The annual number of days of disability per person under 25 years of age was 2.0 for males and 2.7 for females. It will be observed that the average number of days of disability increased more rapidly and at an earlier age for females than for males.

The average daily percentage of employees disabled was less than one until the age group 55–64 years was reached for males, while for females the percentage was over one in the age groups 25–34 years and 35–44 years.

Among the males, each case lasted, on the average, 35.5 days, and among the females 34.8 days. In the two age groups, under 25 years and 35–44 years, there was little difference between the sexes with respect to duration of case, but in the age group 25–34 years the cases among females averaged 5.8 days longer.

There were 84 deaths among males and 5 deaths among females, resulting in a mortality rate per 1,000 of 3.0 and 1.1, and a case fatality rate of 3.8 and 1.1 percent, respectively. Both rates for males showed a decided increase with age.

Table 4.—*Summary of selected morbidity and mortality indexes for different age groups, white male and female employees in the soap industry, 1930–34, inclusive*

Sex	All ages [1]	Age in years as of July 1, 1932					
		Under 25	25–34	35–44	45–54	55–64	65 and over
	Annual number of cases per 1,000 persons						
Male	76.0	68.3	66.0	75.6	92.3	114.1	211.5
Female	98.1	90.9	103.7	116.0	69.4	83.6	-------
	Annual number of days of disability per person						
Male	2.70	2.01	2.12	2.70	3.44	5.81	9.95
Female	3.41	2.71	3.93	4.28	3.10	2.98	-------
	Average daily percentage of employees disabled						
Male	0.7	0.6	0.6	0.7	0.9	1.6	2.7
Female	.9	.7	1.1	1.2	.9	.8	-------
	Average number of days per case						
Male	35.5	29.5	32.1	35.7	37.3	50.9	47.0
Female	34.8	29.8	37.9	36.9	44.6	35.6	-------
	Annual number of deaths per 1,000 persons						
Male	3.0	1.8	1.8	3.2	3.5	9.2	24.6
Female	1.1	1.6	1.2	-------	-------	-------	-------
	Percent of cases ending fatally						
Male	3.8	2.5	2.7	4.2	3.8	7.4	10.9
Female	1.1	1.8	1.1	-------	-------	-------	-------
	Number of cases beginning during 1930–34, inclusive						
Male	2,129	233	751	588	338	174	43
Female	429	167	172	68	16	5	-------
	Number of calendar days of disability						
Male	75,490	6,874	24,096	21,010	12,603	8,856	2,023
Female	14,935	4,978	6,521	2,510	714	178	-------
	Number of years of disability						
Male	206.8	18.8	66.0	57.6	34.5	24.3	5.5
Female	40.9	13.6	17.9	6.9	2.0	.5	-------
	Number of person-years of membership						
Male	28,001.2	3,413.0	11,379.7	7,778.7	3,662.6	1,525.2	203.3
Female	4,374.9	1,837.5	1,658.3	586.0	230.4	59.8	.5
	Number of deaths						
Male	84	6	21	25	13	14	5
Female	5	3	2	-------	-------	-------	-------
	Number of ended cases during 1930–34, inclusive						
Male	2,184	239	770	600	339	188	46
Female	439	170	179	67	17	5	-------

[1] Includes some of unknown age.

Frequency of disabilities by detailed diagnosis groups.—The annual number of cases per 1,000 persons is shown for each sex, by age group and diagnosis, in table 5. Considering only cases among males, it will be noted that there was a marked increase in frequency with age for certain specific diagnosis groups. This becomes more clear if rates are calculated for the six broad age groups rather than for the two groups as given in the table. Thus, rheumatic diseases, beginning with a rate of 1.5 for males under 25 years, rose in successive 10-year age periods as follows: 2.4, 8.1, 11.7, 17.0, and 44.3, the rate from the youngest to the oldest age group increasing more than 29 times. Diseases of the skin for the same period increased more than 16 times in frequency, while circulatory diseases increased 12 times. Respiratory diseases and digestive diseases did not fluctuate greatly until the oldest age group was reached. Infectious and parasitic diseases showed a greater frequency in the younger age groups; from a rate of 7.6 under 25 years, there was a continuous decline to 2.6 at 55–64 years. Diseases of the pharynx and tonsils and appendicitis likewise were less common in the older age groups.

For females it was not practicable to make a division into age groups other than under 35 years and 35 years and over. According to this division, a pronounced rise in rate with age is observed for nonindustrial injuries, diseases of the circulatory system, and diseases of the skin. A sharp decrease among older persons was noted for respiratory diseases, especially diseases of the pharynx and tonsils, and influenza and grippe. The same was also shown for appendicitis, and for infectious and parasitic diseases. In general the most decided changes with age among females followed the same trend as among males. Notable exceptions are the decline in the respiratory disease rate for older females and the failure of the rheumatic rate to show a rapid increase with age.

While for all disabilities the female rate for ages under 35 years was 46 percent in excess of the corresponding male rate, and 17 percent in excess for ages 35 years and over, yet there were specific diagnosis groups where the opposite trend was observed. For pneumonia and hernia the rate for males was higher among both young and old persons. Indeed, no cases of hernia were reported among females. For males under 35 years the rate was greatly in excess for nonindustrial injuries and to a lesser extent for diseases of the teeth and gums, ulcer of the stomach or duodenum, and diseases of the circulatory system. Among males 35 years of age and older there was an excess in the rate for diseases of the pharynx and tonsils, acute and chronic bronchitis, respiratory tuberculosis, influenza and grippe, rheumatic diseases, and infectious and parasitic diseases. The excess in the rate for females was most pronounced for influenza and grippe and genitourinary diseases among the younger

TABLE 5.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, by sex, for the age groups under 35 years and 35 years and over, according to detailed diagnosis groups, white employees in the soap industry, 1930–34, inclusive*

Diagnosis	Annual number of cases per 1,000 persons						Number of cases [1]					
	White males			White females			White males			White females		
	All ages	Under 35 years	35 years and over	All ages	Under 35 years	35 years and over	All ages [2]	Under 35 years	35 years and over	All ages [3]	Under 35 years	35 years and over
Total, all diagnoses	76.0	66.5	86.8	98.1	97.0	101.5	2,129	984	1,143	429	339	89
Nonindustrial injuries	8.0	7.2	9.0	4.8	2.9	12.5	225	106	119	21	10	11
Sickness	68.0	59.3	77.8	93.3	94.1	89.0	1,904	878	1,024	408	329	78
Respiratory diseases	27.8	26.8	28.9	40.3	43.2	27.4	779	397	381	176	151	24
Diseases of the pharynx and tonsils	5.7	7.6	3.5	9.6	11.8	1.1	159	113	46	42	41	1
Bronchitis, acute and chronic	2.2	1.5	3.1	2.7	2.9	2.3	63	22	41	12	10	2
Other diseases of the upper respiratory tract	1.8	1.8	2.0	3.2	2.6	4.6	52	26	26	14	9	4
Influenza, grippe	14.2	12.5	16.1	20.8	22.0	16.0	397	185	212	91	77	14
Pneumonia, all forms	1.7	1.3	2.0	1.2	1.1	1.1	47	20	27	5	4	1
Pleurisy	.9	1.0	.7	1.4	1.1	2.3	25	15	10	6	4	2
Respiratory tuberculosis	1.0	.9	1.1	1.2	1.4		28	13	14	5	5	
Other respiratory diseases	.3	.2	.4	.2	.3		8	3	5	1	1	
Digestive diseases	13.4	13.9	12.9	20.8	20.0	24.0	375	205	170	91	70	21
Diseases of the teeth and gums	.9	1.1	.6	.9	.8	1.2	24	16	8	4	3	1
Ulcer of the stomach or duodenum	1.4	.8	2.0	.9	.6	2.3	38	12	26	4	2	2
Other diseases of the stomach, cancer excepted	.9	.6	1.3	1.4	1.4	1.2	26	8	18	6	5	1
Diarrhea, enteritis	1.7	1.3	2.3	3.0	2.9	3.4	49	19	30	13	10	3
Appendicitis, with or without appendectomy	5.3	7.4	2.9	11.6	12.3	9.1	148	110	38	51	43	8
Hernia	1.3	1.3	1.3				36	19	17			
Other digestive diseases	1.9	1.4	2.5	3.0	2.0	6.8	54	21	33	13	7	6
Nonrespiratory-nondigestive diseases	26.4	18.5	35.2	32.0	30.6	37.6	738	274	463	140	107	33
Diseases of the circulatory system	3.8	1.9	6.0	2.3	1.1	6.8	107	28	79	10	4	6
Genitourinary diseases	2.9	2.2	3.6	5.7	5.7	5.7	80	33	47	25	20	5
Rheumatic diseases	6.2	2.2	10.7	3.2	3.1	3.4	173	32	141	14	11	3
Diseases of the nervous system	1.9	1.9	1.8	4.6	4.3	5.7	53	29	24	20	15	5
Diseases of the skin	1.7	.9	2.6	1.6	.9	4.6	47	13	34	7	3	4
Other infectious and parasitic diseases	5.5	6.2	4.6	6.4	7.2	3.4	154	92	61	28	25	3
Other nonrespiratory-nondigestive diseases	4.4	3.2	5.9	8.2	8.3	8.0	124	47	77	36	29	7
Ill-defined or unknown diagnoses	.4	.1	.8	.2	.3		12	2	10	1	1	
Number of person-years of membership							28,001.2	14,792.7	13,169.8	4,374.9	3,495.8	876.7

[1] See table 3, footnote 1. [2] Includes 2 cases of unknown age. [3] Includes 1 case of unknown age.

NOTE.—Of interest is the information available for the same period from a rubber manufacturing company which shows the following rates for white males of all ages: All diagnoses, 78.0; nonindustrial injuries, 14.5; respiratory diseases, 20.4 (the difference reflecting principally cases of influenza and grippe); digestive diseases, 14.4; nonrespiratory-nondigestive diseases, 27.8; and unknown diagnoses, 0.9. Specific diseases which had slightly higher rates than for the soap industry included diseases of the circulatory system, 4.5; rheumatic diseases, 7.4, and diseases of the skin, 2.5.

group, and appendicitis and diseases of the nervous system among those of all ages.

From the viewpoint of the four principal diagnosis groups, for all ages the position of females was most unfavorable for digestive diseases, with an excess in the rate of 55 percent, while for respiratory diseases there was an excess of 45 percent, and for nonrespiratory-nondigestive diseases an excess of 21 percent. Nonindustrial injuries were less common among females. The fact that maternity cases were not eligible for sickness benefits should be kept in mind when comparing rates for the sexes

Rates by occupation.—The frequency of disabilities for each sex, by occupation, is shown, among other things, in table 6 and the age-standardized frequency rates are shown graphically in decreasing order of magnitude in figure 1. It will be observed that the rates for males vary from 134.9 cases per 1,000 for soap handlers and process laborers to 31.8 for office workers. The rates for females, on the other hand, describe a narrower range, varying from 117.1 for packing-machine operators to 74.5 for office workers. Each of the 3 male occupations having standardized rates greater than 100 includes laborers, while occupations with the lowest rates include supervisory and white-collar workers. Packing-machine operators and process operators have rates nearest to that for all occupations (86.1).

TABLE 6.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, annual number of days of disability per person, and average number of days per case, by occupational group and sex, white employees in the soap industry, 1930–34, inclusive*

Occupational group	Annual number of cases per 1,000 persons		Annual number of days of disability per person	Average number of days per case	Number of cases [2]	Number of calendar days of disability	Number of person-years of membership
	Crude	Standardized [1]					
				Males			
Soap handlers and process laborers	116.5	134.9	4.11	35.3	259	9,141	2,223.4
Laborers (n. e. c.)	117.3	126.7	4.35	37.1	133	4,937	1,133.7
Warehouse laborers	101.3	110.7	2.97	29.3	109	3,193	1,076.0
Maintenance workers	99.4	98.1	3.44	34.6	427	14,762	4,293.7
Packing laborers	93.0	93.5	3.46	37.2	178	6,618	1,914.7
Packing-machine operators	98.4	86.1	3.31	33.7	80	2,695	813.2
All occupations	*76.0*	*86.1*	*2.70*	*35.5*	*2,129*	*75,490*	*28,001.2*
Process operators	72.0	78.9	2.56	35.5	229	8,134	3,180.5
Salesmen	59.7	64.1	2.12	35.6	253	9,002	4,239.3
Foremen	48.3	59.3	2.01	41.6	103	4,288	2,132.2
Office workers	33.2	31.8	1.01	30.3	131	3,975	3,947.8
All others	74.5	78.2	2.87	38.5	227	8,745	3,046.7
				Females			
Packing-machine operators	138.2	117.1	5.26	38.1	182	6,933	1,316.9
All occupations	*98.1*	*93.1*	*3.41*	*34.8*	*429*	*14,935*	*4,374.9*
Office workers	75.3	74.5	2.35	31.2	191	5,955	2,536.9
All others	107.5	90.4	3.93	36.6	56	2,047	521.1

[1] Age standardized according to the total white gainfully employed workers in the United States (6).
[2] See table 3, footnote 1.

The annual number of days of disability per worker for males, as shown in table 6, will be observed to follow almost the same ranking by occupation as the standardized frequency rates, the highest being 4.35 days for laborers (not elsewhere classified) and the lowest being 1.01 days for office workers. On the other hand, the average number of days per case does not rank by occupation in the same order as the two rates just mentioned. Foremen, with comparatively infrequent disabilities, had the maximum average number of days per case of 41.6, while the minimum average number of days per case was 29.3 for warehouse laborers who had a high frequency rate.

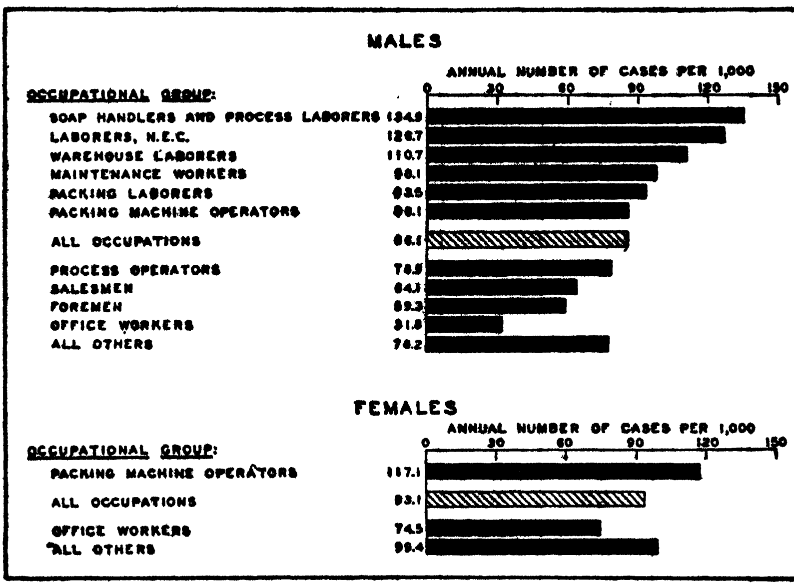

FIGURE 1.—Annual number of cases per 1,000 males and females, respectively, of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer according to occupational group, white employees in the soap industry, 1930–34, inclusive. (The rates are age-standardized according to the total white gainfully employed workers in the United States.)

Frequency of disabilities by occupation, age, and broad diagnosis groups.—Table 7 shows for a twofold age division of each occupational group the frequency of disabilities by broad diagnosis groups. It is of interest to know the type of diagnosis which is relatively the most unfavorable for a particular occupation. A certain rate may be low with respect to all occupations, yet high from the viewpoint of the occupation itself. For males under 35 years of age the highest ratios of specific rate to the rate for all occupations were as follows: Nonindustrial injuries among soap handlers and process laborers, warehouse laborers, packing-machine operators, and process operators; respiratory diseases among laborers (not elsewhere classified) and maintenance workers; digestive diseases among salesmen, foremen,

TABLE 7.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer for each occupational group by age, under 35 years and 35 years and over, and ratio of specific occupational group to all occupations, according to broad diagnosis groups, white male and white female employees in the soap industry, 1930–34, inclusive*

Occupational group	All sickness and nonindustrial injuries[1]				Nonindustrial injuries				Sickness												Person-years of membership	
									Respiratory diseases				Digestive diseases				Nonrespiratory-nondigestive diseases					
	Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total			
	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over
	White males																					
All occupations	66.5	86.8	1.00	1.00	7.2	9.0	1.00	1.00	26.8	28.9	1.00	1.00	13.9	12.9	1.00	1.00	18.5	35.2	1.00	1.00	14,792.7	13,169.8
Office workers	37.4	23.6	.56	.27	2.9	3.4	.40	.38	14.5	8.4	.54	.29	10.2	6.7	.73	.52	9.8	5.1	.53	.14	2,752.8	1,185.5
Salesmen	57.2	62.6	.86	.72	4.3	3.6	.60	.40	20.7	20.9	.77	.72	17.6	14.6	1.27	1.13	14.6	23.0	.79	.65	2,323.5	1,915.8
Foremen	30.5	61.2	.46	.71	4.5	6.4	.62	.71	7.9	13.7	.29	.47	9.0	11.3	.65	.88	9.1	29.8	.49	.85	886.2	1,241.0
Process operators	67.9	76.3	1.02	.88	8.9	15.0	1.24	1.67	25.4	23.1	.95	.80	10.8	6.9	.78	.53	22.2	31.3	1.20	.89	1,574.7	1,599.9
Soap handlers and process laborers	114.1	119.2	1.72	1.37	14.5	13.4	2.01	1.49	51.1	33.4	1.91	1.16	17.0	25.7	1.22	1.99	31.5	45.8	1.70	1.30	1,174.7	1,048.7
Packing-machine operators	95.5	106.7	1.44	1.23	14.8	19.4	2.06	2.16	37.9	63.1	1.41	2.18	16.5	9.7	1.19	.75	26.3	14.5	1.42	.41	607.1	206.1
Packing laborers	77.9	116.9	1.17	1.35	6.0	9.4	.83	1.04	33.4	40.3	1.25	1.39	12.0	17.5	.86	1.36	26.5	49.7	1.43	1.41	1,168.6	744.0
Warehouse laborers	105.8	97.7	1.59	1.13	24.9	11.8	3.46	1.31	35.2	38.7	1.31	1.34	18.7	11.8	1.35	.91	27.0	32.0	1.46	.91	482.2	503.8
Maintenance workers	82.1	110.9	1.23	1.28	8.0	8.6	1.11	.96	35.0	40.5	1.31	1.40	16.7	15.7	1.20	1.22	22.4	44.5	1.21	1.26	1,742.2	2,542.3
Laborers (n. e. c.)	101.3	129.3	1.52	1.49	10.3	12.3	1.43	1.37	47.6	47.7	1.78	1.65	18.6	9.2	1.34	.71	22.7	58.5	1.23	1.66	463.8	649.9
All others	55.1	96.3	.83	1.11	3.8	9.7	.53	1.08	24.4	29.1	.91	1.01	12.5	9.7	.90	.75	14.4	47.1	.78	1.34	1,597.4	1,442.8
	White females																					
All occupations	97.0	101.5	1.00	1.00	2.9	12.5	1.00	1.00	43.2	27.4	1.00	1.00	20.0	24.0	1.00	1.00	30.6	37.6	1.00	1.00	3,495.8	876.7
Office workers	71.1	92.9	.73	.92	1.9	17.7	.66	1.42	29.8	17.7	.69	.65	17.8	15.5	.89	.65	21.1	42.0	.69	1.12	2,083.0	452.2
Packing-machine operators	142.7	104.4	1.47	1.03	4.3	6.5	1.48	.52	67.9	26.1	1.57	.95	25.8	19.6	1.29	.82	44.7	52.2	1.46	1.39	1,163.0	153.2
All others	100.1	114.3	1.03	1.13	4.0	7.4	1.38	.59	40.0	44.2	.93	1.61	12.0	40.6	.60	1.69	44.1	22.1	1.44	.59	249.8	271.3

[1] Includes a small number of cases with ill-defined or unknown diagnosis.

and office workers; and nonrespiratory-nondigestive diseases among packing laborers. On the other hand, for males 35 years of age and over the highest ratios were for nonindustrial injuries among process operators; respiratory diseases among warehouse laborers, maintenance workers, and packing-machine operators; digestive diseases among soap handlers and process laborers, salesmen, foremen, and office workers; and nonrespiratory-nondigestive diseases among laborers (not elsewhere classified) and packing laborers. It will be observed that digestive diseases are in the most unfavorable position among persons of all ages who have low total frequency rates and are engaged in nonmanual occupations. Those who are engaged in strenuous manual labor and have high total rates are inclined to show an excess of nonindustrial injuries when young and of respiratory diseases when older.

The highest sickness rates among persons under 35 years were for respiratory diseases in 10 out of 11 occupational groups. In 8 occupational groups the second highest rates were for nonrespiratory-nondigestive diseases, and the third highest rates for digestive diseases. Among persons 35 years and over respiratory diseases held first place in 5 occupational groups and nonrespiratory-nondigestive diseases took first place in 6 occupational groups. Digestive diseases fell to third place in all but one group. The increasing absolute importance of nonrespiratory-nondigestive diseases among older people is clearly shown by these figures.

Included under the classification of nonrespiratory-nondigestive diseases there were some specific diseases which had much higher rates in certain occupations, as is shown in the following table giving the rate per 1,000 males. In each instance it will be noted that the frequency of a particular disease in certain occupations far exceeds the rate for the same disease in all occupations. Age apparently does not greatly influence the excess, which remains relatively the same among both the older and younger groups.

Diagnosis group	Occupational group	Annual number of cases per 1,000 males	
		Under 35 years	35 years and over
Circulatory diseases	Soap handlers and process laborers	3.4	13.3
	All occupations	1.9	6.0
Rheumatic diseases	Packing laborers	5.1	22.8
	Laborers (n. e. c.)	8.2	26.2
	All occupations	2.2	10.7
Skin diseases	Maintenance workers	2.3	5.5
	All occupations	.9	2.6

Rates by socio-economic class.—Table 8 and figure 2, which show the frequency of sickness and nonindustrial injuries by socio-economic class, reflect the influence of standards of living and of home condi-

tions more than a strictly occupational classification. Since the nonworking environment is of great importance with respect to the occurrence of disabilities, a classification which takes this into account will show definite gradations. Among males the different socio-economic classes arrange themselves as follows, when the corresponding frequency rates are written in order of increasing magnitude: clerks and salesmen, skilled workers and foremen, semiskilled workers, and un-

TABLE 8.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer by socio-economic class and sex according to broad diagnosis groups, annual number of days of disability per person, and average number of days per case by socio-economic class and sex, white employees in the soap industry, 1930–34, inclusive*

Diagnosis group	Males						Females			
	Total	Clerks and salesmen	Skilled workers and foremen	Semiskilled workers in manufacturing	Unskilled workers	All others	Total	Clerks	Semiskilled workers in manufacturing	All others
	Annual number of cases per 1,000 persons									
Total, all diagnoses [1]	76.0	50.5	72.5	89.4	102.5	59.8	98.1	74.6	136.6	109.1
Nonindustrial injuries	8.0	4.0	6.1	11.3	12.9	4.7	4.8	4.4	4.4	7.8
Sickness [1]	68.0	46.5	66.4	78.1	89.6	55.1	93.3	70.2	132.2	101.3
Respiratory diseases	27.8	17.9	24.9	33.9	39.1	20.9	40.3	28.1	60.6	44.8
Digestive diseases	13.4	13.6	12.5	13.2	15.4	10.1	20.8	16.8	26.3	25.3
Nonrespiratory-nondigestive diseases	26.4	14.9	28.5	30.6	34.4	23.7	32.0	24.9	45.3	31.2
	Annual number of days of disability per person									
Total, all diagnoses	2.70	1.69	2.69	2.99	3.66	2.36	3.41	2.31	5.27	3.81
	Average number of days per case									
Total, all diagnoses	35.5	33.5	37.2	33.4	35.7	39.5	34.8	31.0	38.6	34.9
	Number of cases [2]									
Total, all diagnoses [1]	2,129	367	460	427	721	154	429	186	187	56
Nonindustrial injuries	225	29	39	54	91	12	21	11	6	4
Sickness [1]	1,904	338	421	373	630	142	408	175	181	52
Respiratory diseases	779	130	158	162	275	54	176	70	83	23
Digestive diseases	375	99	79	63	108	26	91	42	36	13
Nonrespiratory-nondigestive diseases	738	108	181	146	242	61	140	62	62	16
	Number of calendar days of disability									
Total, all diagnoses	75,490	12,307	17,087	14,272	25,744	6,080	14,935	5,762	7,219	1,954
	Number of person-years of membership									
Total, all diagnoses	28,001.2	7,272.8	6,343.7	4,773.8	7,035.6	2,575.3	4,374.9	2,492.5	1,369.2	513.2

[1] Includes some cases of ill-defined or unknown diagnosis.
[2] See table 3, footnote 1.

skilled workers. From the first to the last class the rate more than doubled. A similar trend is apparent for each diagnosis group. There was relatively least difference for digestive diseases between the most favored and the least favored socio-economic class and most difference for nonindustrial injuries. The excess in the rate for skilled workers over white-collar workers was almost the same as the excess in the rate for unskilled over skilled. For semiskilled workers the rates were more nearly like those for the unskilled than the skilled.

The females fell chiefly into two socio-economic classes, clerks and semiskilled workers. The latter had a rate 83 percent in excess of the

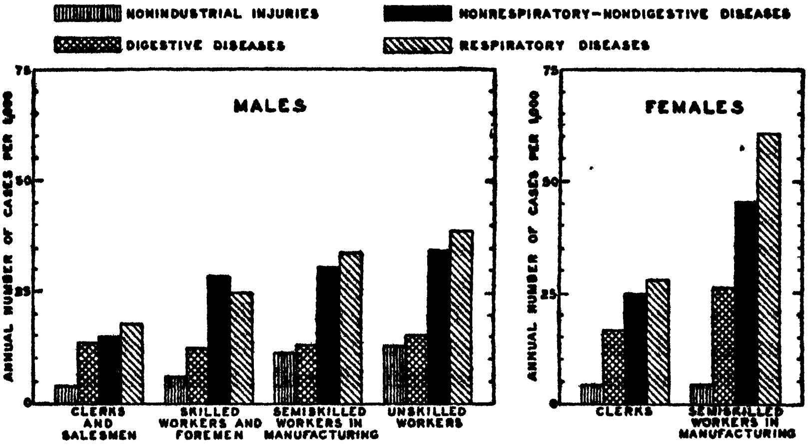

FIGURE 2.—Annual number of cases per 1,000 males and females, respectively, of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer by socio-economic class, according to broad diagnosis group, white employees in the soap industry, 1930–34, inclusive.

former for all diagnosis groups, although the rates for nonindustrial injuries were the same; the excess for respiratory diseases was 116 percent, and for nonrespiratory-nondigestive diseases 82 percent.

According to table 8 the annual number of days of disability per worker for males varied from 1.69 for clerks and salesmen to 3.66 for unskilled workers. The rate for females, which was 26 percent greater than that for males for all classes, was 76 percent greater for semiskilled workers.

For males the average number of days per case does not follow so regular a trend. Unskilled workers had disabilities lasting longer than did clerical or semiskilled workers, but for skilled workers and foremen the average length of case was greater than for the other three groups. Probably this rate was influenced by the fact that the group of skilled workers and foremen included a large proportion of older persons, whose disabilities tend to last longer than those of younger persons.

For female clerks the duration of cases was shorter than for male clerks and salesmen. The reverse was observed for semiskilled workers in manufacturing, where the cases among females were longer by an average of 5.2 days.

SUMMARY

This report deals with sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer among persons engaged in the soap industry. The annual number of cases per 1,000 was 76.0 for males and 98.1 for females, while the annual number of days of disability per person was 2.70 and 3.41, respectively. The average number of days per case was 35.5 among males and 34.8 among females.

Age-standardized frequency rates by occupation among males ranged from 31.8 for office workers to 134.9 for soap handlers and process laborers. High rates were associated with strenuous manual labor, and low rates with white-collar and supervisory occupations. In some occupations certain diagnosis groups showed rates much above the average for all occupations.

According to socio-economic class for males, clerks and salesmen had the lowest frequency rate, followed in order of increasing magnitude by skilled workers and foremen, semiskilled workers in manufacturing, and unskilled workers. Similarly, with respect to females, semiskilled workers in manufacturing showed a higher frequency rate than clerks.

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STUDIES IN CHEMOTHERAPY

IX. ANTIBACTERIAL ACTION OF SOME AROMATIC ARSENIC, SULFUR, AND NITRO COMPOUNDS

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Since the original discovery of Prontosil by Domagk many compounds have been investigated for chemotherapeutic activity. Studies have been directed both to obtaining more effective derivatives and to investigating the relation of chemical structure to therapeutic action. Tréfouël, Nitti, and Bovet first demonstrated the antistreptococcal action of sulfanilamide (p-aminobenzene sulfonamide) and later reported upon a large series of compounds related to it (*1*, *2*). Other contributions include those of Buttle, Gray, and Stephenson (*3*, *14*, *15*), Fourneau et al. (*4*, *5*), Goissedet et al. (*6*), Gley (*7*), Girard (*8*), Bauer and Rosenthal (*9*), Mayer and Oechslin (*10*), Mietzsch (*11*), Whitby (*12*), Crossley, Northey, and Hultquist (*13*). Significant knowledge concerning the effects of position in the benzene ring and of substitutions or replacements of the amino or sulfonamide radical has been gained from such studies.

The discovery of the antibacterial activity of the diphenyl-sulfones, sulfides, disulfides, and sulfoxides (Buttle (*14*, *15*), Fourneau et al. (*16*), Gley (*7*) and Girard (*8*)) marked the first active compounds that did not contain sulfonamide groups.

Active compounds previously described have practically all been sulfur derivatives. While Levaditi (*17*) found that hydroquinone and 4,4′-dioxyazobenzene possess some activity, this action was limited to the "toxi-infection" of the meningococcus and gonococcus in mice, and perhaps related to an antiendotoxic effect under these conditions. Kolmer, Brown, and Raiziss (*20*) have reported upon the activity of 2-amino-5-iodopyridine in suppurative streptococcal lesions in rabbits.

TECHNIQUE

All experiments were carried out upon albino mice. The drugs were administered by mouth or subcutaneously, usually in one-half of the maximum tolerated dose (M. T. D.). The M. T. D. was accepted as the maximum single dose of the drug that killed not more than 10 percent of the animals. Therapy was begun within one-half hour after inoculation of the organisms, and repeated at daily intervals for several doses. Subcutaneous injections of insoluble compounds were made in 0.1 cc. of olive oil. Acid solutions were neutralized with sodium bicarbonate prior to administration.

In the present study the therapeutic index, derived from the ratio of the maximum tolerated dose to the minimum effective dose, as

162189°—39——2

defined below, is only a rough approximation; it is intended to represent only a qualitative appraisal of activity to be employed for purposes of comparison, and not a final coefficient of curative power.

It has become evident (*18, 19*) that toxicity varies considerably from one species to another, and also that the acute toxicity is no reliable indication of the amount of drug which will be tolerated on repeated administration. Another source of difficulty is the variation in therapeutic activity that is experienced from one experiment to another and from one strain of organism to another. The minimum effective dose (M. E. D.) is also conditioned by the length of treatment, the route of administration, the period of observation, and the percentage of survivals taken to represent an effective dose. Even when these factors are standardized, considerable variation in results occurs. The activity of compounds in relation to one another is more constant. In studying a large series of compounds it is desirable to have some basis of comparison; the information obtained under the conditions of our experiments is of value for a preliminary comparison. For our present purposes the survival of one-third to two-thirds of the animals for 10 days was taken as a measure of a minimum effective dose. The results of several experiments were considered in the determination of the M. E. D.

Two highly virulent strains of hemolytic streptocci were employed. Eighteen-hour peptone broth cultures containing rabbit blood were diluted in broth 10^{-6}, and 0.5 cc. was inoculated intraperitoneally. This represented 100 to 1,000 lethal doses of the organisms. Similar tests were carried out with two strains of type I pneumococcus.

RESULTS WITH ARSENIC COMPOUNDS

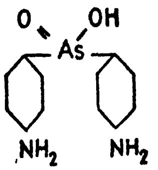
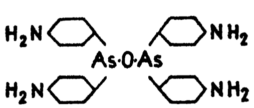
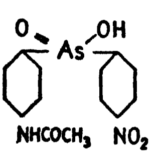
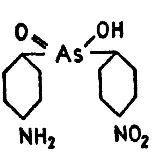
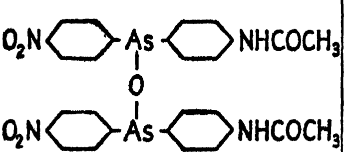
We have investigated a series of compounds structurally similar to some active sulfur compounds, but differing in that the sulfur was replaced by tri- or pentavalent arsenic. Fourneau, Tréfouël, Nitti, and Bovet (*4*) have replaced the sulfonamide radical of sulfanilamide by NH_2, CN, SO_3H, AsO_3H_2 and $CONH_2$, and in each instance the antistreptococcal action was abolished. Tréfouël, Nitti, and Bovet (*2*) also prepared a series of arsenic benzene derivatives containing amino or substituted amino groups (including azo compounds), all of which were inactive.

The toxicity for mice of the arsenic compounds used in this study is shown in table 1. The trivalent arsenicals all possessed irritant properties, as shown by local induration at the site of the injection.

No active arsenic compounds structurally analogous to sulfanilamide were obtained. 4-Aminophenyl and 4-nitrophenyl arsonic acid were inactive. Tryparsamide was inactive although it was tolerated in mice in doses up to 1.0 gm. per kilo (tables 4 and 5).

The sulfur compounds most active against streptococci are 4,4′-diaminodiphenylsulfone and the corresponding nitroamino derivative. We have found 4,4′-diaminodiphenylarsinic acid (Ba 25) and the corresponding arsyloxide (Ba 28) devoid of action. However, 4-nitro-4′-aminodiphenylarsinic acid (Ba 30) showed some activity both by mouth and upon subcutaneous injection (tables 2, 3, and 5).

TABLE 1.—*Preliminary study of acute toxicity for mice of some arsenic and sulfur compounds*

Compound	Number of mice	Dose (gm. per kilo)	Route	Mortality (percent)
Ba 25 	8	0.05	S. C	0
	8	.125	S. C	25
	8	.25	S. C	100
	10	.15	Oral	0
	10	.3	Oral	0
	5	.05	I. V	0
	5	.1	I. V	0
Ba 28 	5	0.01	S. C. (4) [1]	0
	5	.025	S. C. (4)	0
	10	.05	S. C	70
	10	.10	S. C	100
Ba 29 	5	0.05	S. C	0
	5	.1	S. C	0
	5	.25	S. C	80
	5	.5	S. C	100
	10	.25	Oral	0
	6	.5	Oral	0
	5	1.0	Oral	40
Ba 30 	5	0.025	S. C	20
	5	.05	S. C	0
	5	.10	S. C	100
	5	.25	Oral (2)	0
	5	.5	Oral (2)	100
Ba 31 	10	0.025	S. C. (oil)	0
	16	.05	S. C	0
	5	.1	S. C	40
	5	.2	S. C	40
	5	.025	Oral	80
	5	.05	Oral	100

[1] Figures in parentheses represent repetition of dosage on successive days

Table 1.—*Preliminary study of acute toxicity for mice of some arsenic and sulfur compounds*—Continued

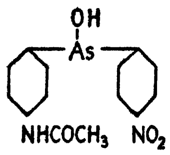
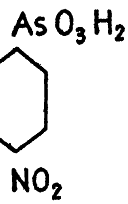
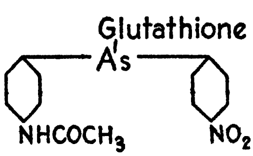
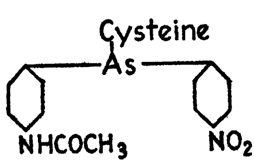
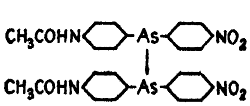
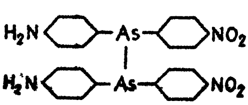
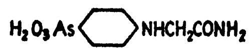
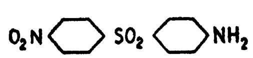
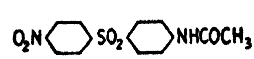
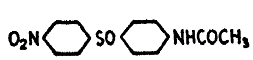
Compound	Number of mice	Dose (gm. per kilo)	Route	Mortality (percent)
Ba 31b 	5	0.025	S. C. (oil)	0
	5	.05	S. C.	0
	10	.1	S. C.	10
	5	.25	S. C.	20
Ba 33 	5	0.025	S. C.	0
	5	.05	S. C.	0
	5	.075	S. C.	40
	5	.10	S. C.	80
	5	.25	S. C.	100
Ba 34 	5	0.0125	S. C.	0
	13	.025	S. C.	77
	6	.05	S. C.	100
Ba 42 	5	0.025	S. C.	0
	5	.05	S. C.	0
	5	.10	S. C.	80
Ba 46 	5	0.10	S. C. (oil)	0
	5	.20	S. C.	0
	6	.4	S. C.	33
Ba 49 	5	0.05	S. C. (oil)	0
	5	.10	S. C.	40
	5	.25	S. C.	100

TABLE 1.—*Preliminary study of acute toxicity for mice of some arsenic and sulphur compounds*—Continued

Compound	Number of mice	Dose (gm. per kilo)	Route	Mortality (percent)
Atoxyl 	10 5	0.25 .5	S. C. S. C.	10 60
Tryparsamide 	5 5	1.0 2.0	S. C. S. C.	0 40
Ba 35 	5 5 5	0.25 .50 1.0	Oral Oral Oral	0 20 80
Ba 36 	5 5 5 6	0 5 1 0 2.0 4.0	Oral Oral Oral Oral	N 0 0 0 33
Ba 37 	5 5 5	0.5 1 0 2 0	Oral Oral Oral	0 0 0

Acetylation of 4-nitro-4′-aminodiphenylarsinic acid (Ba 29) caused an increase of antistreptococcal action and at the same time a decrease in toxicity of one-half. When administered in amounts close to the tolerated dose, curative effects, with a certain percentage of permanent survivors, could be obtained. This favorable effect of acetylation of arsenic compounds has several counterparts in the field of trypanocidal and spirillocidal derivatives (i. e., arsacetin). By mouth the activity of Ba 29 was approximately the same as equal doses of sulfanilamide, but on subcutaneous injection it was more active.

The corresponding trivalent arsenic derivative was obtained both as an anhydride, 4,4″-dinitro-4′,4‴-diacetyldiamino-tetraphenylarsyloxide (Ba 31), and as a hydroxy compound, 4-nitro-4′-acetylamino-diphenylarsylhydroxide (Ba 31b). Both forms were approximately twice as active and twice as toxic as the pentavalent compound. Curative effects were seen with 0.025 to 0.05 gm. per kilo (0.5 to 1 mg. per 20-gm. mouse). They were insoluble and were administered

TABLE 2.—*Comparative activity of some asymmetric arsenic and sulfur compounds against streptococcal infections in mice*

Number	Compound	Dosage	Number of mice	Deaths in days 1	2	3	4	5	6	7	8	9	10	11–14	15–21	Mortality (percent)	Organism
Ba 29	4-acetylamino-4'-nitrodiphenylarsinic acid	0.015×2 days subcutaneous 0.01×2 days subcutaneous	20	9	8	1	1							1	1	95	Streptococcus No. 995, 10^{-6}.
Ba 31	4,4''-dinitro-4',4'''-diacetyldiaminotetraphenylarsyloxide	0.015×2 days subcutaneous 0.01×2 days subcutaneous	20	5	5	4		1	2					1	1	95	
Ba 35	4,4'-aminonitro diphenylsulfone	0.015×2 days subcutaneous 0.01×2 days subcutaneous	20	2	1				2		3		3	3	3	85	
	Sulfanilamide	0.4×2 days subcutaneous 0.3×2 days subcutaneous	20	2	2				4		1		1	3	2	75	
	Controls		18	13	3						1					95	
Ba 29	4-acetylamino-4'-nitrodiphenylarsinic acid.	0.025×4 days subcutaneous.	20	3	2	1		3	1	3				1		70	Streptococcus No. 995, 10^{-6}.
Ba 30	4-amino-4'-nitrodiphenylarsinic acid	do	20	9	1	1	3			3					1	90	
Ba 31		do	20	4		4	1	3		2	1			1	3	95	
Ba 31b	4-acetylamino-4'-nitrodiphenylarsyloxide.	do	20	5	5	2				2					1	75	
Ba 34	Glutathione derivative of Ba 31	0.01×4 days subcutaneous.	20	5	4		1	1	2	2		1	1		1	90	
Ba 35	4-amino-4'-nitrodiphenylsulfone	0.025×4 days subcutaneous.	20			1				1	5		1	3	3	70	
	Sulfanilamide	0.4×4 days subcutaneous	20				2	1	3	2	2	1	4	4	1	100	
	Controls		20	19										1		100	
Ba 29		0.05×2 days subcutaneous	10		6	2	1									90	Streptococcus No. 1685, 10^{-6}.
		0.05×2 days oral	10		6	4										100	
Ba 31		0.05×2 days subcutaneous	20			3	6	4	3	1	1				1	95	
	Controls		20	20												100	
Ba 31		0.05×1 day subcutaneous 0.25×1 day subcutaneous	20			2	6	2	4		1		1	1		85	Streptococcus No. 1685, 10^{-6}.
	Sulfanilamide	0.15×1 day subcutaneous 0.015×1 day subcutaneous	20		1	3	9	6								95	
	Controls		18	15	3											100	
Ba 34	Glutathione derivative of Ba 31	0.015×2 days subcutaneous. 0.01×2 days oral	20	1					2	4			2			45	Streptococcus No. 1685, 10^{-6}
Ba 35	4-amino-4'-nitrodiphenylsulfone	0.03×2 days oral 0.02×2 days oral	20	1	1				5	1		1	1			50	
Ba 36	4-acetylaminonitrodiphenylsulfone	0.03×2 days oral 0.02×2 days oral	20		1				6	1	1	1			1	55	

Ba 37	4 - acetylamino - 4' - nitrodiphenyl-sulfoxide.	0.03×2 days oral; 0.02×2 days oral	20	10	18	1											95	
	Controls		20	16	4												100	
Ba 34		0.015×2 days subcutaneous; 0.01×2 days subcutaneous.	12					2	1		1	1	1	1	1		75	Streptococcus No. 1685, 10^{-4}.
Ba 34		0.01×4 days subcutaneous.	15	3	7			1	1	1							86	
Ba 37		0.2×2 days oral; 0.15×2 days oral	15		3	1			2	1	3						66	
	Sulfanilamide	0.5×2 days oral; 0.38×2 days oral	15		1	2			1			1		1			40	
	Controls		15	15													100	
Ba 34	Glutathione derivative of Ba 31	0.0125×4 days subcutaneous.	15	1		1	1	2			1	1					46	Streptococcus No. 1685, 10^{-4}.
Ba 42	Cysteine derivative of Ba 31	0 025×4 days subcutaneous.	15	1	5	2	1	1			1		1				80	
	Controls		15	11	4												100	

subcutaneously in olive oil. The toxicity of the anhydride was greater orally than subcutaneously, differing in this respect from other compounds in this series.

The soluble glutathione (Ba 34) and cysteine (Ba 42) derivatives [1] of Ba 31 and Ba 31b were prepared. The glutathione derivative was twice as toxic and four times as active as the parent compound. Curative effects against streptococci could be shown with 0.01 to 0.015 gm. per kilo (0.2 to 0.3 mg. per 20-gm. mouse). This represents an activity equal to that of the highly active sulfones. Although the toxicity of the cysteine derivative was less, therapeutic activity was diminished to a greater extent than toxicity (tables 2 and 5).

By further reduction of 4-nitro-4′-aminodiphenylarsinic acid and its acetyl derivative, two arsines were prepared, Ba 46 and Ba 49. As in the case of the arsinic acid, the acetyl derivative was more active and less toxic than the deacetylated compound. The acetylated derivative (Ba 46) was highly insoluble and was poorly absorbed from the site of its subcutaneous injection in oil. Curative effects were seen with 0.1 gm. per kilo, while it was tolerated in twice this dosage (tables 4 and 5).

The activity of the arsenic compounds was characterized by a limited range of dosage. Therapeutic effects which were pronounced with a given dose diminished rapidly when the dose was decreased.

All of the arsenic compounds in this series were tested against a virulent strain of pneumococcus type I, but no appreciable activity was observed with any of them.

The following arsenic compounds were also tested against *Trypanosoma equiperdum* infection in mice: Ba 25, Ba 28, Ba 29, Ba 30, Ba 31, and Ba 42. Only Ba 42 (cysteine derivative) possessed some trypanocidal action, bringing about prolongation of life but no permanent survival when given in one-half the maximum tolerated amount for 3 doses at intervals of 3 days.

SULFUR COMPOUNDS

Included for comparative purposes are those sulfur compounds analogous to the arsenic derivatives in this series (table 2). With the exception of 4-nitro-4′-acetylaminodiphenylsulfone, they have been previously investigated.

4,4′-Diaminodiphenylsulfone is among the most active compounds against streptococcal infections in mice (*14*, *16*, *21*, *22*). 4-Nitro-4′-aminodiphenylsulfone has been found to be of equal activity and toxicity (*5a*, *15*). Our results are in general agreement with these findings; approximately 0.025 to 0.03 gm. per kilo (0.5 to 0.6 mg. per 20-gm. mouse) represented an effective dose. 4-Nitro-4′-acetylamino-

[1] The chemical structure of these derivatives has not yet been established.

TABLE 3.—*Antistreptococcal action of some arsenic compounds administered orally to mice*

Number	Compound	Dosage (gm. per kilo)	Number of mice	Deaths in days: 1	2	3	4	5	6	7	8	9	10	11–14	15–21	Mortality (percent)	Organism
Ba 29	4-acetylamino-4'-nitrodiphenylarsinic acid.	0.15×3 days	20	1		3	3	2	1	1	1		1	1		70	Streptocococcus No. 1685, 10^{-4}.
Ba 30	4-amino-4'-nitrodiphenylarsinic acid	do	20		11	2	1	2	2	1						95	
Ba 25	4, 4'-diaminodiphenylarsinic acid	do	20	20													
	Controls		20	20													
Ba 29		0.15×4 days	20	6	3	1	2		1	1		1		1		80	Streptococcus No. 995, 10^{-4}.
Ba 30		do	20	6	3	3	1	1				2				80	
Ba 25		do	20	16	3	1										100	
	Sulfanilamide	do	20	1	1	3	4	1	2	2	2			1		85	
	Controls:																
	10^{-4}		20	12	4	3			1							100	
	10^{-6}		4	1				1	1							75	
Ba 29		0.15×3 days	20	4	4	1	1	2	3	1	1			1		90	Streptococcus No. 995, 10^{-4}.
Ba 30		do	20	4	7	3	4		1	1						100	
Ba 25		do	20	10	3	1	1	1	2	1						95	
	Sulfanilamide	do	20		1		1		3	7		2	1	1		80	
	Controls:																
	10^{-4}		20	10	4	3	3									100	
	10^{-6}		4	2	2											100	
Ba 29		0.15×4 days	20	4	4	3	2	3	2							90	Streptococcus No. 1685, 10^{-6}
Ba 30		do	20	5	8	3	2	2								100	
Ba 25		do	20	17	3											100	
	Sulfanilamide	do	20		9				6				1			80	
	Controls:																
	10^{-4}		20	17	2											95	
	10^{-6}		5	5												100	

TABLE 4.—*Comparative antistreptococcal activity of some arsenic and sulfur compounds*

Number	Compound	Dosage, S. C. (gm. per kilo)	Number of mice	Deaths in days												Mortality (per-cent)	Organism
				1	2	3	4	5	6	7	8	9	10	11–14	15–21		
Ba 46	4, 4''-diacetyldiamino-4', 4'''-dinitro-tetraphenyldiarsyl.	0.1×2 days; 0.05×1 day	15	1	1		2		4		1		1	1	1	80	Streptococcus No. 995, 10^{-6}.
	Sulfanilamide	0.5×2 days; 0.25×1 day	15			2	1	1	2	1	2				1	66	
	Controls		15	11	4											100	
Ba 46		0.035×3 days	20	10	4	3				1						90	Streptococcus No. 995, 10^{-6}.
Ba 49	Deacetylated Ba 46	do	20	16	3	1										100	
	Controls		20	18	2											100	
Ba 46		0.05×3 days	15	2	6	1	3			1		1		1		100	Streptococcus No. 1685, 10^{-6}.
	Controls		15	15												100	
Ba 33	4-nitrophenylarsonic acid	0.05×1 day	20	18	2											100	Streptococcus No. 1685, 10^{-6}.
	Tryparsamide	1.0×1 day; 0.5×1 day	20	17	3											100	
	Atoxyl	0.2×1 day; 0.1×1 day	20	16	4											100	
	Controls		20	16	4											100	
Ba 35	4-amino-4'-nitrodiphenylsulfone	0.0125×4 days (oral)	20	2	5	3	1	1	4	1						85	Streptococcus No. 1685, 10^{-6}.
Ba 18	4, 4'-diaminodiphenylsulfone	do	20	3	4	4		1				2	1		1	80	
	Controls		20	16	3	1										100	
Ba 18		0.03×3 days (oral)	20	1	3	3	1	1	4	1				1		75	Streptococcus No. 995, 10^{-6}.
Ba 35	4-amino-4'-nitrodiphenylsulfone	do	20	3	2	2	4	1	2	1			1		1	85	
Ba 36	4-acetylamino-4'-nitrodiphenylsulfone	do	20	3	5	1	3	1		2			1			85	
	Controls		10	5	3		1						1			100	

TABLE 5.—*Summary of the toxicity and therapeutic activity against streptococci of some arsenic and sulfur compounds (drugs administered subcutaneously unless otherwise stated)*

Number	Compound	M. T. D., gm. per kilo	M. E. D. (streptococcus) gm. per kilo	Therapeutic index
Ba 25	4,4'-diaminodiphenylarsinic acid	0.05	None	0
Ba 25	4,4'-diaminodiphenylarsinic acid (oral)	.3	do	0
Ba 28	4,4',4'',4'''-tetraaminotetraphenylarsyloxide	.025	do	0
Ba 29	4-acetylamino-4'-nitrodiphenylarsinic acid	.1	0.1	1
Ba 29	4-acetylamino-4'-nitrodiphenylarsinic acid (oral)	.5	0.15-0.25	2
Ba 30	4-amino-4'-nitrodiphenylarsinic acid	.05	Slight	<1
Ba 30	4-amino-4'-nitrodiphenylarsinic acid (oral)	.25	do	<1
Ba 31	4',4'''-diacetyldiamino-4,4''-dinitrotetraphenylarsyloxide	.05	0.05	1
Ba 31b	4-acetylamino-4'nitrodiphenylarsylhydroxide	.05	0.05	1
Ba 34	Glutathione derivative of Ba 31b	.025	0.0125	2
Ba 42	Cysteine derivative of Ba 31	.05	0.025-0.05	1-2
Ba 46	4,4''-diacetyldiamino-4',4'''-dinitrotetraphenyldiarsyl	.2	0.1	1-2
Ba 49	4,4''-diamino-4',4'''-dinitrotetraphenyldiarsyl	.05	Slight	<1
Ba 33	4-nitrophenyl arsonic acid	.05	None	0
	Atoxyl	.25	do	0
	Tryparsamide	1.0	do	0
	Sulfanilamide	(*oral*) 2.5	0.4-0.75	3.3-6
Ba 18	4,4'-diaminodiphenylsulfone	.15	0.025	6
Ba 35	4-amino-4'-nitrodiphenylsulfone	.25	0.03	8
Ba 36	4-acetylamino-4'-nitrodiphenylsulfone	2.0-3.0	0.03	70-100
Ba 19	4,4'-diacetyldiaminodiphenylsulfone	[1] >8.0	0.2	>40
Ba 37	4-acetylamino-4'-nitrodiphenylsulfoxide	>2.0	0.2	>10

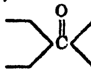
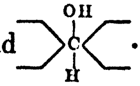
[1] The low acute toxicity of this compound is deceptive since it is only partially absorbed from the alimentary canal. This may also apply to the oral toxicity of other compounds in this series.

diphenylsulfoxide was less active. It is of interest that the corresponding diaminodiphenyl arsenic compounds were inactive while the nitroamino compounds were active.

The favorable effect of acetylation upon the therapeutic action of the 4-nitro-4′-aminodiphenyl arsenic compounds was not to be anticipated from the results with sulfur compounds. Acetylation of sulfanilamide reduces its activity to a trace. Acetylation of 4,4′-diaminodiphenylsulfone reduces its activity several fold, although toxicity is decreased to an even greater extent. Incomplete absorption from the alimentary tract is a factor in the decreased toxicity of this compound (*9*, *21*, *22*).

Our results with the asymmetric arsenic compounds led us to study the acetylated derivative of 4-nitro-4′-aminodiphenylsulfone. Our results in mice indicate that acetylation of this compound does not diminish its antistreptococcal activity while it does bring about a decrease in toxicity to approximately one-tenth of the free compound (tables 2, 4, and 5). This derivative possesses a very high therapeutic index against streptococcal infections in mice; while variation in absorption and excretion might account for some of the decrease in toxicity, the fact that the therapeutic activity is not decreased makes this observation of significance. Results in pneumococcal infections in mice were much less marked, and showed no appreciable superiority over the other sulfones in this series.

AROMATIC NITRO AND AMINO COMPOUNDS

Experiments were carried out with a series of 4,4′-diamino, -dinitro and -nitroamino compounds possessing the linkages  and . In spite of the relatively low toxicity of these compounds no therapeutic activity was observed against streptococcal or pneumococcal infections in mice. These compounds, the benzophenones, and benzhydrols represent a replacement of arsenic or sulfur by carbon.

At the suggestion of one of us (E. E.) some simple nitro- and nitrosobenzene derivatives were investigated. Some activity against pneumococcus infections in mice was observed with p-nitro-benzoic acid.[2] This compound was more toxic than sulfanilamide but with maximum tolerated doses a prolongation of life was observed which was as great as or greater than the effect of similar doses (by weight) of sulfanilamide. Only rarely, however, did survival occur as a result of therapy. The toxicity by mouth was less than that upon subcutaneous injection, and greater prolongation of life could be obtained by oral administration (tables 6 and 7).

[2] Since this was written a report of the antistreptococcal and antipneumococcal action of p-nitrobenzoic acid and some esters by R. L. Mayer and C. Oechslin has appeared (Compt. Rend. Soc. Biol., 130: 211 (1939)).

TABLE 6.—*Toxicity and antibacterial activity of some benzophenones, benzhydrols, nitro and amino benzoic acids and related compounds*

Compound	M. T. D., gm. per kilo	Route	Activity
4,4'-dinitrodiphenylmethane	2.0	S. C. (oil)	0
4,4'-dinitrobenzophenone [1]	1.5	S. C. (oil)	0
4-amino-4'-nitrobenzophenone [1]	1.5	S. C. (oil)	0
4,4'-diaminobenzophenone [1]	.5	Oral	0
4,4'-tetramethyldiaminobenzophenone	2.0	S. C. (oil)	0
4,4'-diaminobenzhydrol [1]	.5	S. C. (oil)	0
4,4'-diaminobenzhydrol [1]	1.0	Oral	0
4,4'-tetramethyldiaminobenzhydrol	1.0	Oral	0
2-nitrobenzoic acid	0.5	S. C., oral	0
3-nitrobenzoic acid	.5	S. C., oral	0
4-nitrobenzoic acid	.5	S. C.	[2] Moderate
4-nitrobenzoic acid	1.0	Oral	[2] Moderate
1,3,5-trinitrobenzoic acid	.3	S. C.	0
4-nitrobenzamide	1.0	S. C. (oil)	[2] Trace
4-nitrobenzhydrazide	.03	S. C. (oil)	0
4-nitrosobenzoic acid [1]	.08	S. C.	0
4-hydroxylaminobenzoic acid [1]	.5-1.0	S. C.	0
4-aminobenzoic acid	4.0	S. C.	0
4-aminobenzoic acid	2.0-4.0	Oral	0
4,4'-azoxybenzoic acid [1]	.5-1.0	S. C.	0
4,4'-azoxybenzoic acid [1]	1.0	Oral	0
4,4'-azobenzoic acid [1]	.2	S. C.	0
4,4'-azobenzoic acid [1]	.5	Oral	0
4-nitrobenzaldehyde	.5	S. C. (oil)	[2] Moderate
4-nitrobenzaldehyde	1.0	Oral	[2] Moderate
4-nitrobenzal bromide	1.0	S. C. (oil)	[2] Moderate
4-nitrobenzal bromide	.5-1.0	Oral	[2] Moderate
4-nitrobenzyl chloride	.5	S. C. (oil)	[2] Slight
4-nitrobenzyl chloride	.5-1.0	Oral	[2] Slight
4-nitrotoluene	1.0	Oral	[2] Moderate
4-nitroaniline	1.0	Oral	0
4-nitrodiphenylamine	.5-1.0	S. C. (oil)	0
4-nitroacetanilide	.5	S. C. (oil)	0
4-nitrophenylglycine	.5	S. C.	0
1-nitro-3-methoxyphenol	.5	S. C.	0
1-nitro-4-methoxyphenol (4-nitroanisol)	2.0	S. C. (oil)	0
1,4-dinitrobenzene	.05	Oral	0
4-nitrodiphenyl	2.0	S. C. (oil)	0
4,4'-dinitrodiphenyl	2.0	S. C. (oil)	0
4,4'-dinitroaminoazobenzene	1.0	S. C., oral	0
4,4'-dinitrodiphenyl ether	1.0	S. C. (oil)	0
4-nitrosophenol sodium	0.125	S. C.	0
4-nitrosodimethylaniline	.025	S. C. (oil)	0
4-nitrosodiphenylamine	.05	S. C. (oil)	0
Diphenyl nitrosoamine	.5	S. C. (oil)	0
Diphenyl nitrosoamine	1.0	Oral	0

[1] Prepared by H. B.
[2] Prolongation of life, especially against pneumococcus.

4-Nitrobenzoic acid differed from compounds of the sulfur and arsenic series in that activity was less marked upon streptococcal than upon pneumococcal infections. With maximum doses some prolongation of life was observed but the effect was much weaker than that obtained with similar doses of sulfanilamide.

Experiments were also carried out upon a series of compounds related to 4-nitrobenzoic acid. Substitution of the COOH group by CHO, CH_3 or $CHBr_2$ did not greatly affect the activity; 4-nitrobenzyl chloride (CH_2Cl) was less active (tables 6 and 7).

Substitution of COOH by $CONH_2$ (4-nitrobenzamide) decreased activity to a trace; substitution by $CONH.NH_2$ (4-nitrobenzhydrazide) abolished activity, but only small doses could be given because of toxicity. Replacement of the COOH group by NO_2 (1-4-dinitroben-

TABLE 7.—*The action of 4-nitrobenzoic acid and related compounds upon pneumococcal infections in mice*

Compound	Dosage (gm. per kilo)	Number of mice	Deaths in days 1	2	3	4	5	6	7	8	9	10	Mortality (percent)	Organism
4-nitrobenzoic acid	0.5 x 2 days oral 0.25 x 2 days oral	15	1	1	2	10							93	Pneumococcus Mulf. I, 10^{-5}
Do	0.5 x 1 day S. C. 0.25 x 3 days S. C.	15		5	3	6	1						100	
Sulfanilamide	0.5 x 2 days oral 0.25 x 1 day oral	15	1	11	3								100	
Controls		15	5	10									100	
4-nitrobenzoic acid	0.5 x 2 days oral 0.3 x 2 days oral	15		3	3	7	2						100	Pneumococcus Mulf. I, 10^{-5}
Do	0.5 x 1 day S. C. 0.3 x 3 days S. C.	15	6	5	2		2						100	
Sulfanilamide	0.5 x 2 days oral 0.3 x 2 days oral	15	4	9	1	1							100	
Controls		15	8	7									100	
4-nitrobenzoic acid	0.5 x 3 days S. C.	20	8	2	10								100	Pneumococcus Lederle I, 10^{-6}
Sulfanilamide	0.5 x 3 days S. C.	20		4	9	3	3						100	
Controls		20	18	2									100	
4-nitrobenzoic acid	0.75 x 1 day oral 0.5 x 2 days oral	12		5	7								100	Pneumococcus Lederle I, 10^{-6}
4-nitrobenzaldehyde	0.5 x 2 days oral	15		5	9	1							100	
Controls		15	8	7									100	
4-nitrobenzal bromide	0.5 x 2 days oral	15	2	4	7	2							100	Pneumococcus Lederle I, 10^{-6}
4-nitrobenzyl chloride	0.25 x 2 days oral	15	6	7	2								100	
Controls		15	15											
4-nitrobenzoic acid	0.3 x 3 days oral	15		5	9	1							100	Pneumococcus Lederle I, 10^{-6}
4-nitrobenzyl chloride	0.3 x 3 days oral	15	2	12	1								100	
Controls		15	12	3									100	
4-nitrotoluene	0.5 x 2 days oral 0.25 x 1 day oral	15	5	6	2	2							100	Pneumococcus Lederle I, 10^{-6}
Do	0.25 x 1 day S. C.	15	5	9	1								100	
4-nitrobenzoic acid	0.25 x 1 day oral	10	1	7	1		1						100	
Controls		15	12	3									100	

zene), NH_2 (4-nitroaniline), $NH.CH_2COOH$ (4-nitrophenylglycine), $NH. C_6H_5$ (4-nitrodiphenylamine), $NH.COCH_3$ (4-nitroacetanilide), $O.CH_3$ (4-nitroanisol), C_6H_5 (4-nitrodiphenyl), or AsO_3H_2 (4-nitrophenylarsonic acid) abolished activity in tolerated doses. The inactivity of the benzophenones and benzhydrols has already been referred to (table 6).

Reduction of the nitro group of 4-nitrobenzoic acid abolished activity. Various stages of reduction were represented by 4-nitroso-, azoxy-, azo-, hydroxylamino-, and aminobenzoic acid, all of which were inactive.

Mayer and Oechslin (*10, 23*) have investigated the various products of oxidation of the amino group of sulfanilamide. Their series included the corresponding 4-nitro-, 4-nitroso-, azoxy-, azo-, 4-hydroxylamino-, and 4-aminobenzenesulfonamide. They report activity for all members of the series except the azo compound; 4-nitrobenzenesulfonamide was more active but also more toxic than the amino derivative (sulfanilamide). The benzoic acid derivatives differ, therefore, from the sulfonamide series in that activity has been observed only for the nitro compound.

Changes of the position in the benzene ring to ortho- and meta-nitrobenzoic acid destroyed activity. 1-3-5-Trinitrobenzoate was also inactive.

Other related compounds, all inactive, were 1-nitro-3-methoxyphenol, 4-nitrosophenol sodium, 4,4′-dinitroaminoazobenzene, 4-nitrosodiphenylamine, diphenylnitrosoamine, 4-nitrosodimethylaniline, 4,4′-dinitrodiphenyl, 4,4′-dinitrodiphenyl ether (table 6).

DISCUSSION

The interest in the compounds reported in this paper lies in the relationship of their structure to their antibacterial action. Chemotherapeutic activity of two different types of compounds containing no sulfur also affords new possibilities of chemical approach to the problem. Some of the arsenic compounds with a structure corresponding to the highly active diphenyl sulfur compounds were found to possess a high degree of activity, thus giving evidence that sulfur is not essential to therapeutic action. However, of the active arsenic compounds so far obtained, the toxicity has been such that the effective dose closely approaches the toxic dose.

Acetylation of the 4-nitro-4′-aminodiphenylarsinic acid did not diminish therapeutic activity, although it did decrease toxicity. This was also true for the corresponding arsine, as well as the asymmetric 4-nitro-4′-aminodiphenylsulfone. This is evidence that a nitro group in certain structural arrangements may be more important than a free amino group. Other evidence to this effect was shown in that 4-nitro-4′-aminodiphenylarsinic acid (Ba 30) was active while the correspond-

ing diamino compound (Ba 25) was inactive. Likewise, some antibacterial activity was found for p-nitrobenzoic acid and related compounds, while the corresponding p-amino derivative, although of lower toxicity, was devoid of activity. Buttle and co-workers (*15*) reported a trace of antistreptococcal action for 4,4′-dinitrodiphenylmethane, while the amino compound was inactive. In our experiments no appreciable activity was observed with the former compound.

The difficulties, however, must be pointed out in separating the activity of a certain radical from that of the rest of the molecule. As examples may be cited the facts that the diaminodiphenylarsinic compounds are inactive while the corresponding sulfur compounds are active; 4-aminobenzoic acid is inactive while 4-aminophenylsulfonamide is active; 4-nitrophenylsulfonamide is more active than the amino compound but 4,4′-dinitrodiphenylsulfone is less active than 4,4′-diaminodiphenylsulfone.

Mayer (*10*) found p-nitrobenzenesulfonamide five times as active as the amino compound (sulfanilamide), while p-hydroxylaminobenzene sulfonamide was highly bactericidal *in vitro* but only slightly active in the body. Mayer suggested (*23*) that the hydroxylamino compound is the active derivative formed from sulfanilamide in the body; he explained its slight action *in vivo* on a basis of its rapid oxidation at the site of injection.

In our experiments any reduction of the nitro group of 4-nitrobenzoic acid abolished activity. While the greater toxicity of the nitroso compound might have reduced the tolerated dose to where no effect was obtained, this would not account for the inactivity of the hydroxylamino, the amino, the azoxy, and the azo derivatives. The importance of the carbonyl (CO) group in the para position is also seen in that only those compounds containing this or a closely related group were active.

SUMMARY

Two new types of chemical compounds have been found to possess antibacterial properties.

(a) The asymmetric 4-nitro-4′-aminodiphenylarsinic acid and corresponding arsyloxide and arsine were active against streptococcal infections in mice. Acetylation increased activity and lowered toxicity but the effective doses were close to the toxic doses. The symmetric 4,4′-diaminodiphenylarsinic acid and arsyloxide were inactive.

(b) 4-Nitrobenzoic acid, the aldehyde, 4-nitrobenzal bromide, 4-nitrobenzyl chloride and 4-nitrotoluene possessed some activity, particularly against pneumococcal infections in mice.

The various reduction products of 4-nitrobenzoic acid were inactive, as were likewise the symmetric and asymmetric benzophenones and benzhydrols, and a series of other nitro and nitroso compounds.

Some sulfur compounds were included for their comparative activity. It was found that acetylation of 4-nitro-4′-aminodiphenylsulfone decreased its toxicity without decreasing its antistreptococcal activity. This compound possesses a very high therapeutic index against streptococcal infections in mice.

The fact that antibacterial properties have been demonstrated for some asymmetric arsenic compounds containing a nitro group, and also for some simple aromatic nitro compounds, demonstrates the importance of the nitro group and also that sulfur is not essential to therapeutic activity.

Chemical Supplement

By HUGO BAUER

4,4′-Diaminodiphenylarsinic acid (Ba 25) was prepared according to L. Benda (*24*) and F. L. Pyman and W. C. Reynolds (*25*).

4,4′,4″,4‴-Tetraaminotetraphenylarsyloxide (Ba 28) was prepared by reduction of 4,4′-diaminodiphenylarsinic acid in hydrochloric acid solution by means of sulfur dioxide, employing iodine as a catalyst. The tetrahydrochloride thus obtained yielded the free amino compound in fine needles upon treatment with ammonia. Melting range 85–90° C.

4-Nitro-4′acetylaminodiphenylarsinic acid (Ba 29).—This compound was formed by the action of diazo-p-nitroaniline upon p-acetylaminophenylarsinoxide in a dilute solution of acetic acid. The colorless needles melted at 258° C. Analysis: $C_{14}H_{13}O_5N_2As$. Calculated As 20.58 percent; found As 20.43 percent.

4-Nitro-4′-aminodiphenylarsinic acid (Ba 30).—The corresponding acetyl compound was deacetylated by heating with concentrated hydrochloric acid. Yellow needles. M. P. 239° C. Analysis: $C_{12}H_{11}O_4N_2As$. Calculated As 23.26 percent; found As 23.61 percent.

4,4″-Dinitro-4′,4‴-diacetyldiaminotetraphenylarsyloxide (Ba 31).—4-Nitro-4′-acetylaminodiphenylarsinic acid was reduced with sulfur dioxide and a trace of iodine in a mixture of glacial acetic acid and hydrochloric acid. The compound was precipitated with water and crystallized from benzene. The pale yellow needles contained benzene of crystallization. Melting range 95–99° C. Analysis: $C_{28}H_{24}O_7N_4As_2+2C_6H_6$. Calculated As 17.97 percent; found As 18.28 percent.

4-Nitro-4′-acetylaminodiphenylarsylhydroxide (Ba 31b).—The corresponding arsyloxide (Ba 31) was dissolved in a solution of dilute sodium hydroxide and dilute acetic acid was added. The hydroxide crystallized in colorless needles which showed no sharp melting point, but softened at about 70° C. Analysis: $C_{14}H_{13}O_4N_2As$. Calculated As 21.53 percent; found As 20.89 percent.

4-Nitrophenylarsonic acid (Ba 33).—For preparation see H. Bart (*26*).

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4,4''-Dinitro-4',4'''-diacetyldiaminotetraphenylarsyloxide+glutathione (Ba 34).—Equal parts of the components were dissolved in a small amount of alcohol along with a little water, and warmed to about 40° C. for 5 minutes. The mixture was evaporated in a vacuum desiccator.

4-Nitro-4'-acetylaminodiphenylarsylhydroxide+cysteine (Ba 42).—A mixture of the components containing an excess of cysteine was prepared as described for the glutathione preparation. The resulting product was not further investigated chemically.

4,4''-Dinitro-4',4'''-diacetyldiaminotetraphenyldiarsyl (Ba 46).—4-Nitro-4'-acetylaminodiphenylarsinic acid in an acetone solution was reduced with hypophosphorous acid containing a trace of potassium iodide. Yellow powder. Analysis: $C_{28}H_{24}O_6N_4As_2$. Calculated As 22.63 percent; found As 22.65 percent.

4,4''-Dinitro-4',4'''-diaminotetraphenyldiarsyl (Ba 49).—The reduction of 4-nitro-4'-aminodiphenylarsinic acid was made with hypophosphorous acid in the presence of potassium iodide. Orange powder. Analysis: $C_{24}H_{20}O_4N_4As_2$. Calculated As 25.92 percent; found 25.22 percent.

4-Nitro-4'-aminodiphenylsulfone (Ba 35).—The acetyl derivative (Ba 36) was deacetylated by heating with a mixture of equal parts of concentrated hydrochloric acid and alcohol for one-half hour. The hydrochloride thus obtained yielded the free base upon treatment with ammonia; it was recrystallized from alcohol. Yellow needles, M. P. 172° C. Analysis: $C_{12}H_{10}O_4N_2S$. Calculated S 11.53 percent; found S 11.67 percent. (See Buttle et al. (*15*).)

4-Nitro-4'-acetylaminodiphenylsulfone (Ba 36).—4-Nitro-4'-aminodiphenylsulfide (F. Kehrmann and E. Bauer (*27*)) was acetylated. Ten gm. of the acetyl compound were dissolved in 100 cc. of glacial acetic acid, 5 cc. of 30 percent hydrogen peroxide added, and the mixture boiled for one-half hour. Following the addition of water the solution was cooled. Nine gm. of yellowish crystals which separated out were recrystallized from alcohol. M. P. 223° C. Analysis: $C_{14}H_{12}O_5N_2S$. Calculated S 10.01 percent; found 10.13 percent.

4-Nitro-4'-acetylaminodiphenylsulfoxide (Ba 37).—Sixty gm. of 4-nitro-4'-acetylaminodiphenylsulfide were dissolved in 600 cc. of glacial acetic acid, 27 cc. of 30 percent hydrogen peroxide added, and the mixture heated at 100° C. for 3 hours. Upon addition of water crystals separated which were recrystallized from alcohol. Thirty-nine gm. of yellowish needles were obtained which melted at 212° C. Analysis: $C_{14}H_{12}O_4N_2S$. Calculated S 10.54 percent; found 10.53 percent.

4,4'-Dinitrobenzophenone (Ba 48).—For preparation see W. Staedel (*28*).

4,4'-Diaminobenzophenone (Ba 50).—For preparation see W. Staedel and E. Sauer (*29*).

4-Nitro-4'-aminobenzophenone (Ba 55).—This compound, not previously described, was prepared by partial reduction of 4, 4'-dinitrobenzophenone with alcoholic ammonium sulfide. Orange needles crystallized from alcohol. M. P. 179° C. Analysis: $C_{13}H_{10}O_3N_2$. Calculated N 11.57 percent; found 11.65 percent.

4, 4-'Diamino benzhydrol (Ba 51).—For preparation see H. Wichelhaus (*30*).

4-Hydroxylaminobenzoic acid (Ba 54).—4-Nitrobenzoic acid, in the form of its barium salt, was reduced with zinc dust in the presence of ammonium chloride, according to the method of E. Bamberger and F. L. Pyman (*31*). White needles were obtained with no melting point, but which showed decomposition beginning at about 170–175° C. This compound reduced Fehling's solution at room temperature.

Analysis: $C_7H_7O_3N$. Calculated N 9.15 percent; found 8.85 percent.

4-Nitrosobenzoic acid (Ba 53).—4-Hydroxylaminobenzoic acid was oxidized with ferric chloride; a yellow amorphous precipitate was formed. With diphenylamine sulfuric acid reagent a deep red color is produced. The compound has been described previously by F. I. Alway (*32*).

p-Azoxybenzoic acid (Ba 45).—*p-Azobenzoic acid* (Ba 44). For preparation see G. Bachrach and R. Weinstein (*33*).

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VARIETIES OF MEXICAN TYPHUS STRAINS

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In 1929 one of us (*1*) isolated two strains of typhus from patients during a short-lived epidemic occurring in a village near Mexico City. The strains failed to produce the characteristic scrotal swelling reaction with the regularity observed by Mooser (*2*) in his Mexican strains. One of the strains produced scrotal reaction in two guinea pigs out of 26 serial transfers, the other one showed no scrotal reaction in 25 generations; then by transfer into human lice by the Weigl method and inoculation of the ground lice into guinea pigs, the swelling of the scrotum was established with regularity for a few generations before discontinuing the strain. The isolation of nonorchitic strains in Mexico, before the report of Neil in 1917 and the studies of Mooser in 1928, seems to have been the rule, because the descriptions conform with those of Nicolle in his first communications. The discovery of Dyer, Rumreich, and Badger (*3*), in rat fleas, and by Mooser, Castaneda, and Zinsser (*4*), in the brains of rats of a rickettsial disease similar to the Wilmington and Mooser strains of typhus, was taken as a proof that the New World typhus has a murine origin. The nonorchitic strains isolated in Mexico were considered by Nicolle (*5*) as intermediates between the murine and the Old World typhus.

In 1934, Mooser, Varela, and Pils (*6*) obtained 5 nonorchitic strains from patients during a typical epidemic of typhus. In accordance with the opinion of Nicolle, these authors applied the name "epidemic" to their strains and also considered them as intermediates between murine and Old World typhus. They established a subdivision of the Mexican typhus, separating it into "endemic" and "epidemic" strains, corresponding to murine and Europeanlike strains, respectively.

During the past 2 years the typhus incidence in Mexico City has been low if we compare it with previous years. From the cases brought to the General Hospital we isolated several strains of typhus which we consider sufficiently interesting to describe in the present paper.

METHODS AND MATERIALS

Forty-six patients in whom a diagnosis of typhus fever was established by clinical and serological data, were bled from the 4th to the 13th day of the disease and 5 cc. of this blood was injected by intraperitoneal route into a rat in each case We used rats for the first animal transfer following the experience of Mooser, who obtained better results with these animals than by direct inoculation into guinea pigs. Most of the rats were killed from the fifteenth to the twentieth day after the injection; a few were killed later. The

brains were emulsified in saline and injected into male guinea pigs, which were observed daily in order to note the appearance of fever or the scrotal reactions. When the inoculated guinea pigs developed febrile reactions suggestive of the typhus infection, the animals were killed and the brain emulsions transferred to new guinea pigs, usually on the 5th day of the fever. The animals were castrated under ether anesthesia when scrotal swelling was found, and the tunica vaginalis was first smeared for microscopical examination and then washed with salt solution and the washings were injected intraperitoneally into new guinea pigs. Part of the guinea pig brain not used for inoculation was fixed and stained for the study of typhus lesions. The newly isolated strains were submitted to cross-immunity tests, the recovered animals being reinoculated with tunica washings from guinea pigs infected with our "L" orchitic strain.

All strains in which the diagnosis of typhus was established by the finding of rickettsiae in the tunica, typhus lesions in the brain, and by cross-immunity tests were discontinued. Some other strains were lost after one or two transfers in guinea pigs, the last of which did not present fever or swelling but showed immunity when reinoculated with the orchitic "L" strain. The results were considered negative when no fever or swelling was observed in the guinea pigs injected with rat brain and the animals developed typhus fever when reinoculated with the "L" strain. The investigation of the survival of the strain in mice through successive transfers was made in a manner similar to that followed by Savoor and Velasco (7). Tunica or brain emulsions from guinea pigs infected with the strain to be tested were injected in amounts of 2 cc. into three mice by intraperitoneal route and transfers were made at 10-day intervals from mice to mice and into one guinea pig.

In staining the smears of the tunica vaginalis and preparing brain sections for the search for typhus lesions we followed the methods described in our previous publications.

ISOLATION OF TYPHUS STRAINS FROM PATIENTS

From October 1936 to January 1938, 69 patients suffering from typhus fever were admitted to the General Hospital of Mexico City. No attempts were made to isolate typhus strains from cases arriving after the thirteenth day of the disease.

In table 1 is indicated the monthly distribution of typhus patients admitted to the service, the number of cases suitable for rat inoculation, the strains of typhus isolated after transfer to guinea pigs, and those which were lost by premature death of the rats from intercurrent infections or because the guinea pigs did not react to the rat brain inoculation. Forty-six of these cases were bled for rat inocula-

tion, from which 20 typhus strains were recovered and many of these were established in guinea pigs for several generations. Disregarding the 8 cases lost by premature death of the rats, the table shows that from 38 cases of typhus, in more than 50 percent the disease was successfully transferred to laboratory animals by the rat to guinea pig method.

TABLE 1.—*Strains isolated from typhus patients*

Month	Typhus cases admitted to the hospital	Cases transferred into rats	Rats lost before ready for transfer into guinea pigs	Guinea pigs which were negative to inoculation	Number of typhus strains obtained in guinea pigs
1936					
October	4	2	0	1	1
November	1	1	0	0	1
December	1	1	0	0	1
1937					
January	3	2	0	1	1
February	6	3	0	2	1
March	4	3	1	1	1
April	1	1	0	0	1
May	3	2	0	2	0
June	2	1	1	0	0
July	6	3	1	2	0
August	9	8	0	3	5
September	9	4	0	2	2
October	5	3	1	1	1
November	5	4	3	1	0
December	3	3	1	1	1
1938					
January	7	5	0	1	4
Total	69	46	8	18	20

PROPERTIES OF 20 MEXICAN TYPHUS STRAINS

The data concerning the typhus strains from 20 patients is summarized in table 2. It was apparent that the severity of the disease had no influence on its transmission to laboratory animals. Most of the strains were obtained before the tenth day of the disease, and in two cases 1 or 2 days later. No attempts were made after the thirteenth day. The transfer of the infection from rats to guinea pigs was characterized by the appearance of fever, and with strain "L" and in cases 13, 28, and 42 a more or less pronounced swelling of the scrotum was also apparent, which only in strain "L" remained a constant feature of the infection. However, in strain No. 42 the scrotal reaction reappeared in some of the subsequent transfers. Of the remaining strains, nonorchitic in the first transfer, No. 5 became orchitic and the swelling was transmitted for several generations by using tunica washings or brain emulsions for the inoculations. Several strains were lost accidentally or by inapparent typhus infections; others were carried for a sufficient number of transfers to be classified according to their clinical features.

Considering the scrotal swelling as a constant sign of the murine type of typhus we may say that from our 20 strains 2 were murinelike,

because the local reaction was transmitted in from 11 to 112 generations. One of these strains was discontinued in order to save animals, but the other one is still going on and has been successfully used in the elaboration of typhus vaccine and typhus antiserum. Eight strains were lost by inapparent typhus infection after one to six transfers. Of these Nos. 3, 7, and 28 showed one or two scrotal reactions, but the majority of the inoculated animals showed no swelling. The remaining 10 strains were characterized by the Europeanlike course of the infection. However, the scrotal reaction was not infrequent and in many cases lasted as long as in murine strains, which may be accounted for by the considerable doses of inoculum injected, reaching at times one half of a brain into one single guinea pig. In these Europeanlike strains the microscopic examination of the tunica when the scrotal swelling appeared very rarely showed rickettsia bodies.

Strains No. 42, 44, and 45 were transferred from 11 to more than 25 generations, many of the animals showing the scrotal reaction; but this was not easily transferred from tunica material, and with the exception of No. 42, in which three successive swellings were observed, this sign was never produced consecutively. Furthermore, in one instance, X-rayed rats were inoculated with strain 42 and rickettsiae were found in the tunica of such animals, but the inoculation into guinea pigs of the rat tunica washings failed to produce the scrotal swelling.

TABLE 2.—*Varieties of Mexican typhus strains*

Serial number of strain	Date of admission of the patient	Course of the disease	Day of rat inoculation	Transfers into guinea pigs	Guinea pigs inoculated	Guinea pigs with scrotal reaction and fever	Guinea pigs with fever only	Type of the strain	Observations
2	Oct. 27, 1936	Grave	8th	112	250	250	0	Murine	"L" strain used for the preparation of vaccine.
3	Nov. 13, 1936	Fatal	8th	3	4	3	1	Intermediate	Slight unilateral scrotal reaction. Discontinued.
4	Dec. 6, 1936	do	11th	5	6	1	4	European	Last transfer was inapparent.
5	Jan. 2, 1937	do	10th	13	13	11	2	Murine	Discontinued.
7	Feb. 8, 1937	Mild	10th	6	6	2	3	Intermediate	Last transfer was inapparent.
11	Mar. 28, 1937	do	10th	6	6	0	5	European	Do.
13	June 28, 1937	do	8th	3	3	1	1	(?)	Do.
22	Aug. 18, 1937	Grave	10th	7	7	1	6	European	Lost accidentally.[1]
24	Aug. 25, 1937	do	11th	6	6	0	6	do	Do.[1]
25	Aug. 31, 1937	Mild [2]	9th	7	7	0	7	do	Do.[1]
26	do	do.[2]	4th	8	8	0	8	do	Lost by intercurrent infection.
27	do	do.[2]	9th	11	11	1	10	do	Do.
28	Sept. 5, 1937	do	7th	5	5	1	4	(?)	Lost accidentally.[1]
31	Sept. 28, 1937	do	7th	2	2	0	1	(?)	Last transfer was inapparent.
32	Oct. 9, 1937	Fatal	8th	1	1	0	0	(?)	Inapparent infection proved by immunity test.
39	Dec. 3, 1937	Mild	8th	1	1	0	0	(?)	Do.
42	Jan. 11, 1938	do	12th	27	53	10	43	European	Nonorchitic strain No. 42.
44	Jan. 20, 1938	do	9th	17	18	4	14	do	Discontinued.
45	Jan. 21, 1938	do	9th	11	12	2	10	do	Do.
46	Jan. 24, 1938	Fatal	9th	2	2	0	1	(?)	Last transfer was inapparent.

[1] An accident occurred in the animal room which resulted in the loss of several gunies pigs, including those inoculated with strains 22, 24, 25, and 28.

[2] These patients were members of the same family.

BRAIN LESIONS

A search for brain lesions in guinea pigs infected with both orchitic and nonorchitic strains showed that the orchitic strain "L" had little tendency to produce typhus lesions in the brain as compared with nonorchitic strains. The animals were killed on the seventh, eleventh, and sixteenth days, and the lesions were usually found on the eleventh day. Eight nonorchitic strains studied showed brain lesions when the animals were killed on the eleventh to the sixteenth day. The lesions were particularly numerous in strain 42, which we have kept as representative of the Mexican nonorchitic strains.

A systematic study of the brain lesions is now being conducted in a manner similar to that followed by Lillie, Dyer, and Armstrong (*8*).

TRANSFER OF MEXICAN NONORCHITIC STRAINS THROUGH MICE

Since Nicolle and Laigret (*9*) and Laigret and Jadin (*10*) found that Old World typhus was lost by successive transfers in rats and mice, while murine strains were easily kept in these animal species, we found it interesting to test our nonorchitic strains in mice. Strains No. 27, 42, 44, and 45 were inoculated into mice and transferred from mice to mice for three or four generations. The guinea pigs that were injected in order to detect the presence of typhus infection showed that these strains were lost from the second to the third transfer from mice to mice. These experiments show that there is an additional similarity between our nonorchitic strains and the Old World typhus.

VACCINATION EXPERIMENTS AGAINST MEXICAN ORCHITIC AND NONORCHITIC STRAINS

One of our orchitic strains has been used for the preparation of vaccines by methods recommended by Zinsser and Castaneda (*11*). The vaccines contained about 5,000 million rickettsiae per cubic centimeter and have been tested in guinea pigs subsequently inoculated with the homologous strain. This vaccine has been used in this laboratory in 14 workers who have been in close contact with typhus strains. Of these workers one developed a short febrile reaction 1 month after vaccination which, because of the characteristic serologic reaction (*12*), we suspect was an accidental typhus infection.

Recently, a careful study of the vaccine was made in our laboratories by Veintemillas (*13*), who demonstrated that the Mexican vaccine was capable of protecting guinea pigs with a single dose of 1 cc. of formalinized rickettsiae given subcutaneously. Partial protection was obtained by injection of ½, ¼, and even ⅛ cc. The vaccinated animals were tested with the "L" strain used for the preparation of the vaccine. In the same series of experiments Vientemillas observed that guinea

pigs vaccinated with one single dose of vaccine and tested with the nonorchitic strain No. 42 developed typical Europeanlike typhus, exactly as did the nonvaccinated controls. This failure to protect

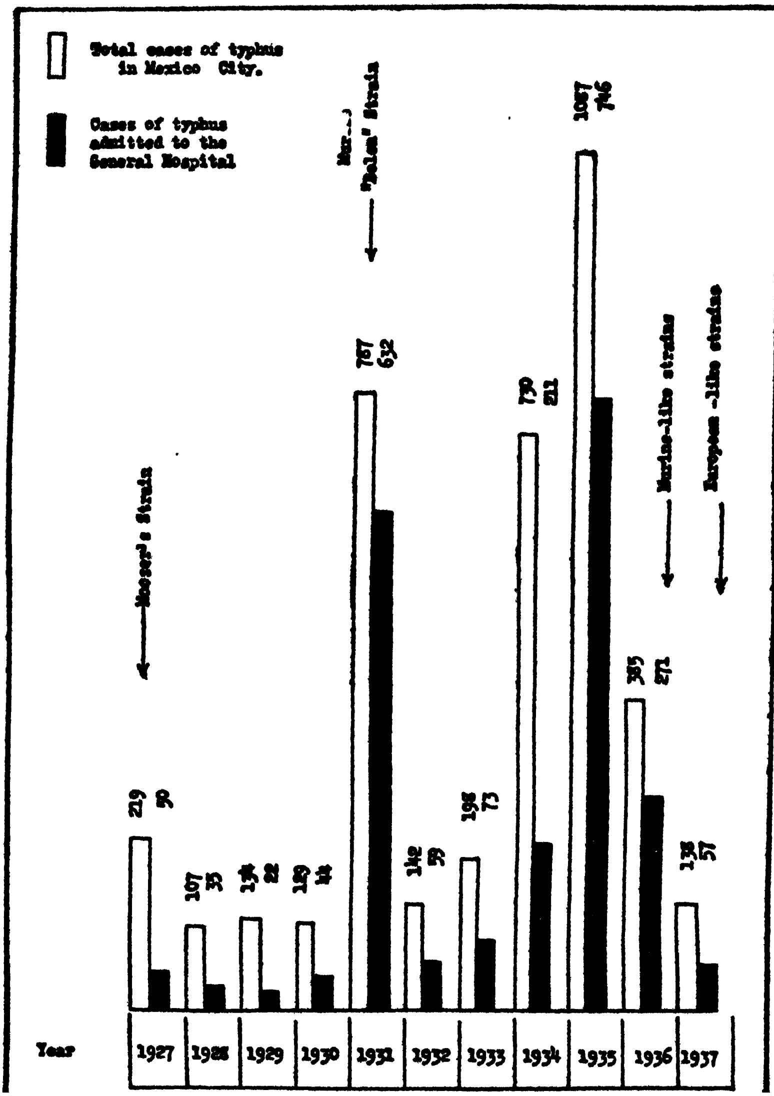

FIGURE 1.

guinea pigs with Mexican vaccine against Mexican nonorchitic strains with doses which were effective against the homologous "L" murine-like typhus shows another property which belongs to the European strains. However, the treatment of guinea pigs with three or four doses of vaccine at 5-day intervals afforded complete protection against strain No. 42.

DISCUSSION

The incidence of typhus fever in the city of Mexico during the 16 months of observation to which we have referred in this paper, was lower than in comparative periods of time in previous years. The number of cases admitted to the General Hospital at an average of 4.5 per month, with a maximum of 9 and a minimum of 1, gives a fair idea of the total monthly incidence in this city. Figure 1 shows the incidence of typhus registered from 1927 to 1937 in Mexico City and suburbs, and in black columns are recorded those admitted to the Hospital. Whether the cases registered from October 1936 to January 1938 may be considered endemic or as a long standing epidemic of low case rate, we are not in a position to discuss, but it is evident that the typical outburst of an epidemic of typhus did not occur within this period of time. The isolation of various strains of typhus which presented great differences from one another corroborates the hypothesis that typhus fever in Mexico is constantly starting from a murine origin and then, by the influence of man-to-man adaptation, undergoes transformation towards the European type. Many strains may revert to the original murine type, but others retain the newly acquired characteristics. This theory, which has been repeatedly sustained by Zinsser, Mooser, Nicolle, and ourselves, is illustrated in table 3. Some of the known strains of typhus are indicated with their relative positions between the murine and European types.

TABLE 3

Strain	Neil-Mooser reaction	Type of the strain
Breinl strain	Incidental	Typical European typhus.
Tunisian typhus	do	European.
"Boston" (Zinsser and Castaneda, 1933).	Not observed	Do.
Strains No. 42, 44, and 45	Frequent	Do.
"Zinacatepec" (Mooser, Varela, and Pils, 1934)	Reverted to orchitic typhus [1]	Intermediates.
"J" strain (Castaneda, 1930)	do.[2]	Do.
No 7	Spontaneously reverted	Do.
"L" strain	Constant	Murine.
American sporadic strains (Maxcy, 1929).	do	Do.
Mooser strain (1928)	do	Do.
Dyer's flea strains (1931)	do	Do.
"Belen" strains (Mooser, Castaneda, and Zinsser, 1931).	do	Typical murine typhus.

[1] The infected animals were inoculated daily in the peritoneum with guinea pig blood.
[2] The strain was transferred through human lice and then recovered in guinea pigs.

One of the most important differences between European and Mexican typhus was that found by Zinsser and Castaneda (*14*) in their cross-immunization experiments. The observation in our laboratory, by Veintemillas (*13*), of similar differences in the protective power of the vaccine against orchitic and nonorchitic Mexican strains is a valuable contribution, because it suggests that the immunological differences are only quantitative. We believe, so far, that it is

premature to consider that the Mexican vaccine is insufficient to protect against the European typhus, as such opinions are based mainly on the relatively short experimental data of Zinsser and Castaneda (*14*). Certain other work in this line cannot be given serious consideration, owing to the low antigenic value of the vaccines with which it was made. The necessity of using rich vaccines is emphasized by the fact, already mentioned, that the vaccine protects better against Mexican orchitic than against Mexican nonorchitic strains, unless we assume that No. 42 is an imported strain.

In regard to the subdivision of Mexican typhus into "endemic" and "epidemic" based on the clinical aspects of the guinea-pig infection, we believe that such designations are not correct. Typical murine-like strains have been found during epidemic periods, and on the other hand our Europeanlike strains were isolated during a non-epidemic period.

SUMMARY

From October 1936 to January 1938, 69 cases of typhus were admitted to the General Hospital of Mexico City. Of these cases, 46 were bled for inoculation into rats and then guinea pigs were inoculated with the brains of those rats which survived 15 to 30 days after injection. Eight rats died from intercurrent infection before they were ready for transfer, but the 38 remaining animals produced in guinea pigs 20 typhus strains. Two of these strains showed the characteristics of the murine typhus; 8 were lost by inapparent infection, but some showed the scrotal reaction after one or more transfers into guinea pigs; and the remaining 10 strains were nonorchitic, showed numerous brain lesions, could not be kept in mice for more than two transfers and had some minor immunological differences from the orchitic strains. These properties correspond to the European type of typhus, but it is our opinion that such strains were not imported.

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ORNITHODOROS PARKERI: DISTRIBUTION AND HOST DATA; SPONTANEOUS INFECTION WITH RELAPSING FEVER SPIROCHETES[1]

By GORDON E. DAVIS, *Bacteriologist, Rocky Mountain Laboratory, United States Public Health Service*

During the past 5 years, the argasid tick, *Ornithodoros parkeri*, described by Cooley (*1*) in 1936, has been collected in Wyoming, Montana, Utah, Washington, and Colorado. Specimens from three collection areas have been found spontaneously infected with relapsing fever spirochetes. It is the only known likely tick vector of this disease in the first four of these States and in the part of Colorado from which it has been collected, but it has not thus far been positively identified with human infection.

DISTRIBUTION AND HOST DATA

All known distribution and host data of this tick are given in table 1. The determinations were made by Entomologist R. A. Cooley of the Rocky Mountain Laboratory.

These data, for the most part, represent chance observations incident to field work on other problems, a fact which suggests that this tick may be much more generally distributed in the regions indicated.

Since rodent burrows appear to be the usual habitat of this tick, and since it engorges rapidly like most other species of its genus, the finding of even a few specimens on rodents may be indicative of a considerable burrow infestation locally. This has proved true wherever the finding of *parkeri* infested rodents has been followed up by an extensive examination of rodent burrows, as in the Poison Spider Creek collection area in Natrona County, Wyo., and in the area 10 miles northeast of Dillon in Beaverhead County, Mont.

[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.

TABLE 1.—*Host, source, and locality data of collections of* Ornithodoros parkeri

Accession No.	State	Locality	Date	Host animal or source	Ticks collected
10711	Wyoming	Poison Spider Creek 40 miles southwest of Casper, Natrona County.[1]	June 7–23, 1934	*Citellus* sp.	1 nymph.
10716				do	Do.
10718				*Lepus* sp.	Do.
10719				*Cynomys* sp.	3 nymphs.
10722				*Citellus* sp.	1 nymph.
11254	do	do.[2]	July 27–29, 1935	Burrow of *Citellus* sp.	44 nymphs and adults.
11259				do	16 larvae, nymphs, and adults.
11260				Burrow and nest of *Citellus* sp.	44 nymphs and adults.
11284	do	30 miles north of Rock Springs, Sweetwater County.[2]	Aug. 5, 1936	*Citellus* sp.	1 nymph.
13756	do	18 miles north of Rock Springs, Sweetwater County.[2]	Aug. 6, 1937	Burrow of *Citellus* sp.	13 nymphs, 1 adult.
13757				do	3 nymphs.
13759				do	4 nymphs.
14840	do	North of Rawlins, Carbon County[1]	July 13, 1938	*Citellus* sp.	1 larva, 1 nymph.
14112			July 14, 1938	Burrow of *Citellus* sp.	16 nymphs, 2 adults.
14113			do	From sand under sage brush near burrow of 14112.	2 nymphs.
14139	do	16 miles north of Rock Springs, Sweetwater County.[1]	July 23, 1938	Burrow of *Citellus* sp.	7 adults.
14140				do	1 nymph.
14141				do	3 adults.
14142				do	1 nymph.
14143				do	1 adult.
13791	do	11 miles south of Rock Springs, Sweetwater County.[1]	do	*Mustela* sp.	11 larvae.
13816				Burrow of *Citellus* sp.	1 nymph.
13812				do	2 nymphs.
13813				do	9 nymphs, 1 adult.
15230	do	Sweetwater County[3]	Aug. 24, 1938	2 *Cynomys leucurus*	1 nymph.
12302A	Utah	Wayne County[3]	Aug. 12, 1936	*Citellus* sp.	6 larvae.
12260A		Washington County[3]	Aug. 11–13, 1936	do	1 larva, 2 nymphs.
15407	do	Uintah County[3]	Aug. 3, 1938	8 *Cynomys leucurus*	1 nymph.
10143	Washington	Near Yakima,[4] Yakima County	June 22, 1934	*Sylvilagus* sp.	Do.
15341	Colorado	Moffat County[3]	June 16, 1938	5 *Cynomys leucurus*	Do.
12601	Montana	10 miles northeast of Dillon, Beaverhead County[3]	June 19, 1936	*Citellus richardsoni*	6 specimens.
12602			do	do	7 specimens.
12603			do	5 *Citellus richardsoni*	14 specimens.
——				Burrow of *C. richardsoni*	3 specimens.
——			June 22, 1936	Burrow and nest of *C. richardsoni*	38 specimens.
——			Aug. 1, 1936	Nest of *C. richardsoni*	11 specimens.
——			Sept. 8, 1936	do	44 specimens.
12798			Oct. 31, 1936	Burrow and nest of *C. richardsoni*	6 specimens.
12794			do	do	2 specimens.
12795			do	do	46 specimens.
12630			July 7, 1936	14 *C. richardsoni*	2 specimens.

12613	do	10 miles south of Cameron, Madison County [2]	June 25, 1936	*C. richardsoni*	1 nymph, 1 adult.
12611	do	15 miles south of Cameron, Madison County [3]	do	*Citellus* sp.	3 larvae, 4 adults.
13223	do	10 miles south of Dillon, Beaverhead County [3]	May 28, 1937	*Peromyscus* sp.	1 larva.

[1] Collected by Bacteriologist Gordon E. Davis, Rocky Mountain Laboratory.
[2] Collected by Laboratory Assistant E. W. Malone, Rocky Mountain Laboratory.
[3] Collected by Assistant Parasitologist W. L. Jellison, Rocky Mountain Laboratory.
[4] Collected by Medical Entomologist Cornelius B. Philip, Rocky Mountain Laboratory.
[5] Collected by field crew operating under Surgeon C. R. Eskey, in charge of the Plague Laboratory, San Francisco, Calif.

Less extensive follow-ups have also resulted in locating tick-infested burrows. For example, a return trip of 150 miles was made to an area where a ground squirrel infested with an engorged larva and an early nymph had been shot. Twenty ticks were collected. Two were found in the sand under a sagebrush not far from a burrow, 16 immature forms were in the burrow near its opening, and a ♀ and ♂ were found at the end of a 16-foot excavation of the burrow through sun-baked prairie clay. In another instance a number of rodents had been taken during a 75-mile across-country drive. Late in the day they were examined for parasites. A weasel yielded 11 partially engorged larvae. On a return trip to the location where the weasel was shot, 13 late nymphs and adults were recovered from 3 ground-squirrel burrows.

Experience suggests that the simplest way of determining the local presence or absence of this tick in a given locality is by the examination (screening may be necessary) of earth pulled out of animal burrows by means of a scraper attached to the end of a rod several feet long.

As shown in table 1, this species has been found feeding on ground squirrels, a jack rabbit, a cottontail rabbit, prairie dogs, a weasel, and a white-footed mouse. This suggests that it is by no means highly selective in its choice of hosts.

In the laboratory it feeds readily on white mice, white rats, guinea pigs, monkeys, and man. The following four feeding experiments on man are recorded.

FEEDING OF *O. PARKERI* ON HUMAN VOLUNTEER

On July 8, 1938, male No. 65 was allowed to engorge on the forearm of a human volunteer. It attached readily, engorged completely, and at end of 14 minutes detached voluntarily. No sensation was felt by the volunteer. The following morning there was a red area 4 mm. in diameter at the site of attachment. There was no itching.

On July 11, 1938, male No. 32 was allowed to engorge on the forearm of the volunteer. It attached readily, engorged completely, and at end of 12 minutes detached voluntarily. No sensation nor itching was felt. A deep red area about 3 mm. in diameter occurred in 1 hour, which enlarged to 5 mm. in 6 hours.

Male No. 31 was allowed to engorge on the forearm. It attached readily, engorged completely, and at end of 15 minutes detached voluntarily. There was no sensation. In 6 hours, a deep red area 3 mm. in diameter appeared.

On July 15 all of the above areas were still red and indurated, considerably elevated, and crateriform with necrotic centers. There was some itching. Healing was gradual.

On Sept. 12, 1938, a second stage nymph, No. 39, was placed on the back of the hand where it attached at once. It engorged com-

pletely in 23 minutes and detached voluntarily. There was no sensation. A hemorrhagic area 2 mm. in diameter was present.

On Sept. 13 there was intense itching during night. On Sept. 23 a small scab was removed.

SPONTANEOUS INFECTIONS WITH SPIROCHETES

Six strains of spirochetes have been recovered from ticks representing three of the collection areas, four from the northern part and one from the southern part of Sweetwater County, Wyo., and one from Beaverhead County, Mont. The ticks from Natrona County, Wyo., the one specimen from Washington, and those from Utah and Colorado were received in alcohol and could not be tested.

These strains are easily maintained in white mice and white rats. In the latter, one strain was carried through 180 transfers. In guinea pigs they produce clinical relapses at which times spirochetes are present in the peripheral blood. Thus far they have not produced febrile periods in rhesus monkeys.

POSSIBLE RELATIONSHIP OF *O. PARKERI* SPIROCHETES TO HUMAN INFECTION

Of the several States in which *O. parkeri* occurs, no case of relapsing fever has been reported from Wyoming and none from the part of Colorado in which *parkeri* was collected. A case occurring near Salt Lake City, Utah, in July 1928, was attended by Dr. H. G. MacNeil, then of that city. Tollefsen (*3*) has reported two cases treated at the Veterans' Facility Administration, Walla Walla, Wash. No satisfactory data have been obtained concerning their points of origin. One apparently was infected at some point in Montana in the early summer of 1927, the other somewhere in Washington in the early fall of 1932.

Since *O. parkeri* is the only known likely transmitting agent of relapsing fever in these two States and since it has been shown that this tick is spontaneously infected with spirochetes which produce a relapsing fever in guinea pigs, it is at least open to suspicion as a transmitting agent to man.

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DEATHS DURING WEEK ENDED JULY 1, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 1, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,369	7,580
Average for 3 prior years	[1] 7,515	
Total deaths, first 26 weeks of year	229,356	221,808
Deaths under 1 year of age	519	519
Average for 3 prior years	[1] 512	
Deaths under 1 year of age, first 26 weeks of year	13,571	13,811
Data from industrial insurance companies:		
Policies in force	67,166,768	69,248,240
Number of death claims	11,326	11,389
Death claims per 1,000 policies in force, annual rate	8.8	8.6
Death claims per 1,000 policies, first 26 weeks of year, annual rate	11.1	9.7

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (. . . .) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0			1		91	15	18	21
New Hampshire	0	0	0	0					91	9	31	31
Vermont	0	0	0	0					1,448	108	30	30
Massachusetts	6	5	0	5					425	361	232	232
Rhode Island	0	0	1	0					420	55	8	20
Connecticut	0	0	1	2	3	1	2	1	448	151	20	78
MID. ATL.												
New York	4	10	21	28	[1] 1	[1] 1	[1] 1	[1] 1	295	738	1,299	1,299
New Jersey [3]	7	6	8	10			7	2	26	22	207	442
Pennsylvania	4	7	28	30					43	85	630	630
E. NO. CEN.												
Ohio	8	11	8	11	4	5		2	10	13	246	387
Indiana	9	6	4	7	6	4		7	6	4	131	67
Illinois [3]	14	21	25	35	2	3	4	5	14	21	177	326
Michigan [3]	1	1	6	7					99	94	714	260
Wisconsin	0	0	2	2	14	8	10	10	380	216	855	821
W. NO. CEN.												
Minnesota	4	2	1	1	2	1			60	31	185	40
Iowa [2]	8	4	0	2					205	101	122	13
Missouri	4	3	14	14			6	11	5	.	36	36
North Dakota	0	0	1	1	58	8	1		110	15	41	1
South Dakota	8	1	1	2					225	30	0	5
Nebraska	0	0	1	2					23	6	29	14
Kansas	0	0	3	5					34	12	31	31

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median
SO. ATL.												
Delaware	0	0	1	1	------	------	------	------	79	4	2	5
Maryland [2 3 4]	12	4	1	3	9	3	1	1	52	17	44	44
Dist. of Col	0	0	2	3	------	------	------	------	380	47	12	20
Virginia [2 4]	19	10	26	6	36	19	------	------	240	128	151	89
West Virginia	8	3	4	4	3	1	11	5	11	4	49	40
North Carolina [2 4]	4	3	5	6	1	1	6	------	54	37	337	127
South Carolina [4]	11	4	10	1	303	111	90	53	19	7	100	18
Georgia [4]	18	11	9	3	7	4	------	------	17	10	0	------
Florida [4]	0	0	5	5	9	3	------	------	39	13	10	9
E. SO. CEN.												
Kentucky	5	3	2	4	10	6	3	3	7	4	45	53
Tennessee	7	4	7	5	12	7	8	8	72	41	46	35
Alabama [4]	16	9	9	9	7	4	10	3	69	39	42	25
Mississippi [2 4]	15	6	3	4	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	7	3	4	3	15	6	10	3	25	10	45	5
Louisiana [4]	15	6	11	11	24	10	9	9	27	11	4	5
Oklahoma	2	1	4	4	8	4	27	12	16	8	17	17
Texas [4]	12	14	13	17	28	34	90	60	82	99	40	86
MOUNTAIN												
Montana	0	0	0	0	19	2	------	------	421	45	0	8
Idaho [4]	0	0	1	0	------	------	------	------	71	7	1	3
Wyoming [2]	0	0	1	1	------	------	------	------	393	18	3	3
Colorado [2 5]	39	8	12	3	48	10	------	------	67	14	55	59
New Mexico	0	0	2	2	------	------	------	1	124	10	5	13
Arizona	25	2	0	1	331	27	11	6	25	2	17	15
Utah [2 3]	20	2	7	0	10	1	------	------	457	46	97	36
PACIFIC												
Washington	9	3	0	1	------	------	------	------	1,600	519	11	69
Oregon	10	2	1	1	15	3	7	6	169	34	14	14
California	18	22	27	24	7	9	11	14	394	481	394	394
Total	8	197	292	292	14	296	326	275	151	3,746	6,523	6,523
27 weeks	15	10,424	12,479	13,385	262	149,771	44,016	102,548	506	338,261	745,983	651,646

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	0	0	2	1	24	4	8	8
New Hampshire	0	0	0	0	0	0	0	0	10	1	2	2
Vermont	0	0	0	0	0	0	2	0	13	1	6	2
Massachusetts	2.4	2	0	0	0	0	1	1	51	43	95	74
Rhode Island	0	0	0	0	0	0	0	0	46	6	6	6
Connecticut	3	1	0	0	3	1	0	0	36	12	23	23
MID. ATL.												
New York	1.6	4	2	11	1.6	4	1	6	43	108	141	212
New Jersey [2]	0	0	0	1	1.2	1	0	1	61	51	81	41
Pennsylvania	2.5	5	2	4	0	0	0	0	65	128	122	177

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934–38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934–38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0.8	1	2	2	0	0	1	1	31	40	.89	100
Indiana	0	0	0	0	0	0	1	1	18	12	30	28
Illinois [2]	0	0	1	5	0	0	2	2	51	78	133	190
Michigan [3]	1.1	1	1	1	4	4	0	0	94	89	135	135
Wisconsin	0	0	0	0	0	0	1	1	100	57	46	87
W. NO. CEN.												
Minnesota	0	0	1	0	0	0	0	0	29	15	25	39
Iowa [2]	0	0	1	0	0	0	2	0	32	16	18	23
Missouri	0	0	0	0	0	0	1	1	10	8	30	25
North Dakota	7	1	0	1	0	0	0	0	15	2	5	5
South Dakota	8	1	0	0	0	0	0	0	45	6	3	9
Nebraska	0	0	1	1	0	0	0	0	15	4	5	9
Kansas	2.8	1	0	0	0	0	0	1	61	22	25	25
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	39	2	2	2
Maryland [2 3 4]	0	0	0	0	0	0	0	0	15	5	12	15
Dist. of Col.	0	0	0	0	0	0	0	0	24	3	5	7
Virginia [2 4]	4	2	1	3	1.9	1	0	1	21	11	11	11
West Virginia	0	0	0	1	0	0	0	1	38	14	10	18
North Carolina [2 4]	2.9	2	1	2	9	6	1	1	10	13	17	15
South Carolina [4]	5	2	1	1	55	20	0	0	0	0	6	2
Georgia [4]	1.7	1	0	0	17	10	1	1	7	4	8	4
Florida [4]	3	1	1	1	12	4	0	0	3	1	1	1
E. SO. CEN.												
Kentucky	5	3	1	2	1 7	1	1	1	12	7	12	14
Tennessee	0	0	3	3	4	2	0	1	26	15	13	11
Alabama [4]	0	0	5	1	4	2	5	4	16	9	11	7
Mississippi [3 4]	5	2	0	0	2.5	1	3	0	18	7	7	5
W. SO. CEN.												
Arkansas	0	0	0	1	0	0	0	0	5	2	2	2
Louisiana [4]	0	0	0	0	0	0	0	0	10	4	8	4
Oklahoma	0	0	2	1	6	3	1	1	8	4	9	8
Texas [4]	0	0	0	1	3	4	0	2	14	17	41	26
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	56	6	0	9
Idaho [2]	0	0	0	0	0	0	0	0	10	1	0	2
Wyoming [2]	0	0	0	0	22	1	0	0	0	0	2	7
Colorado [2 5]	0	0	1	0	0	0	0	0	39	8	18	18
New Mexico	0	0	0	0	0	0	0	0	37	3	9	7
Arizona	0	0	1	0	12	1	1	1	12	1	4	4
Utah [2 3]	0	0	0	0	0	0	0	0	89	9	10	10
PACIFIC												
Washington	0	0	0	1	0	0	0	0	43	14	13	14
Oregon	0	0	0	0	0	0	1	0	25	5	11	11
California	1.6	2	0	2	15	18	4	8	48	53	63	79
Total	1.3	32	28	78	3	84	32	156	37	921	1,283	1,550
27 weeks	1.8	1,205	1,926	3,708	1.8	877	580	1,071	165	111,719	131,647	158,823

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 8, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934–38, median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases	1934–38 median	July 8, 1939, rate	July 8, 1939, cases	July 9, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	8	2	1	24	4	24
New Hampshire	0	0	0	0	0	0	0	0	20	2	0
Vermont	0	0	0	0	13	1	0	0	483	36	16
Massachusetts	0	0	0	0	6	5	1	1	82	70	92
Rhode Island	0	0	0	0	0	0	0	0	99	13	30
Connecticut	0	0	0	0	0	0	4	1	113	38	79
MID. ATL.											
New York	0	0	0	0	2	4	5	7	165	413	406
New Jersey [2]	0	0	0	0	1	1	3	3	264	222	237
Pennsylvania	0	0	0	0	2	4	5	13	235	402	211
E. NO. CEN.											
Ohio	10	13	3	1	5	7	13	10	79	103	156
Indiana	24	16	16	3	7	5	7	7	128	86	15
Illinois [2]	1	2	11	4	5	7	13	12	150	229	292
Michigan [3]	0	0	2	0	1	1	2	5	128	121	300
Wisconsin	2	1	3	9	0	0	2	2	450	256	185
W. NO. CEN.											
Minnesota	10	5	5	5	0	0	1	2	41	21	30
Iowa [2]	41	20	16	10	6	3	0	1	55	27	11
Missouri	12	9	10	4	5	4	17	14	22	17	58
North Dakota	0	0	13	3	15	2	0	0	110	15	13
South Dakota	53	7	6	4	0	0	0	0	0	0	14
Nebraska	0	0	2	4	0	0	0	0	76	20	3
Kansas	0	0	0	0	3	1	4	5	53	19	123
SO. ATL.											
Delaware	0	0	0	0	0	0	0	0	138	7	7
Maryland [2, 3, 4]	0	0	0	0	0	0	6	6	126	41	36
Dist. of Col.	0	0	0	0	0	0	2	1	234	29	4
Virginia [2, 4]	0	0	0	0	66	35	31	16	489	261	242
West Virginia	3	1	0	0	24	9	1	8	24	9	64
North Carolina [2, 4]	0	0	1	0	16	11	29	19	104	112	282
South Carolina [4]	0	0	0	0	96	35	26	21	246	90	208
Georgia [4]	2	1	0	0	42	25	44	38	81	49	75
Florida [4]	0	0	0	0	6	2	1	1	18	6	16
E. SO. CEN.											
Kentucky	0	0	4	2	40	23	28	26	36	21	56
Tennessee	0	0	0	0	58	33	29	24	125	71	83
Alabama [4]	0	0	2	0	11	6	19	19	92	52	39
Mississippi [2, 4]	0	0	0	0	30	12	13	15	------	------	------
W. SO. CEN.											
Arkansas	0	0	0	0	40	16	17	17	45	18	36
Louisiana [4]	0	0	0	0	56	23	15	15	29	12	46
Oklahoma	12	6	3	0	40	20	4	16	6	3	9
Texas [4]	0	0	2	4	36	43	82	61	58	70	261
MOUNTAIN											
Montana	47	5	33	18	28	3	1	2	47	5	0
Idaho [2]	61	6	2	2	0	0	1	0	122	12	0
Wyoming [2]	0	0	0	0	0	0	0	0	65	3	3
Colorado [2, 5]	0	0	0	2	10	2	4	2	246	51	27
New Mexico	0	0	2	0	25	2	7	7	161	13	29
Arizona	0	0	2	0	25	2	3	3	98	8	49
Utah [2, 3]	0	0	0	0	10	1	2	0	546	55	66
PACIFIC											
Washington	6	2	19	11	15	5	0	1	25	8	19
Oregon	0	0	26	3	5	1	0	2	35	7	41
California	11	13	10	3	3	4	6	6	70	85	215
Total	4	107	193	112	14	361	450	450	132	3,272	4,208
27 weeks	12	8,379	12,130	5,685	6	4,164	4,748	4,748	157	105,049	115,995

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 8, 1939, 17 cases as follows: New Jersey, 1; Illinois, 2; Iowa, 1; Maryland, 2; Virginia, 4; North Carolina, 2; Idaho, 1; Wyoming, 1; Colorado, 1; Utah, 2.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 8, 1939, 50 cases as follows: Maryland, 1; Virginia, 2; North Carolina, 4; South Carolina, 2; Georgia, 12; Florida, 2; Alabama, 9; Mississippi, 1; Louisiana, 5; Texas, 12.
[5] Colorado tick fever, Colorado, 2 cases.

ROCKY MOUNTAIN SPOTTED FEVER

Cases of Rocky Mountain spotted fever, which were formerly reported from only a limited area in certain Western States, have in recent years been reported in increasing numbers from Eastern and Central States. The average percent of the total number of cases reported in recent years has been about 29 percent in the New England, Middle Atlantic, and South Atlantic States, combined, and about 5 percent in the Central States.

Reports for previous years indicate that, while cases are reported in every month of the year, February is the month of fewest cases, the season of increased prevalence beginning early in March or possibly in February in the Mountain States, and in late April or early May in the Eastern States. The peak appears to be reached in June in the West and in July in the East. Comparatively few cases are reported after July in the Western States, but cases continue to be reported in considerable numbers in the Eastern States until the middle of September, and in decreasing numbers to the end of the year.

The accompanying table shows, for the current year, by 4-week periods, the number of cases of Rocky Mountain spotted fever reported to the Public Health Service by the health officers of the various States, beginning immediately after the seasonal quiescence of the disease. Similar tables will continue to be published throughout the season of prevalence.

Cases reported by States for 4-week periods, February 26 to July 15, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15
New York				3	3
New Jersey				4	8
Pennsylvania				6	3
Ohio				3	2
Indiana				2	1
Illinois			1	1	5
Iowa			1	10	9
Missouri				1	
Delaware				3	
Maryland			7	13	11
District of Columbia			2	2	2
Virginia			1	13	10
North Carolina				3	13
Georgia					1
Tennessee			1		3
Montana	[1] 2	2	8	5	2
Idaho		4	7	4	5
Wyoming		3	14	16	5
Colorado		2	3	9	4
Utah		2	5	5	6
Washington		2	3	2	
Oregon		9	16	7	2

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
March 1939										
New Hampshire	0	2			2		0	28	0	0
North Carolina	8	67	749	12	5,189	13	0	204	1	14
April 1939										
New Hampshire	0	0			52		0	21	0	
May 1939										
New Hampshire	0	0			12		0	14	0	0
June 1939										
Arkansas	4	9	87	626	89	101	4	17	15	52
Connecticut	1	3	7		2,205		1	114	6	9
Missouri	0	24	1	2	23		0	133	46	18

March 1939

	Cases
New Hampshire:	
Chickenpox	9
Mumps	26
Whooping cough	10
North Carolina:	
Chickenpox	644
Dysentery (amoebic)	1
German measles	52
Septic sore throat	9
Tularaemia	2
Typhus fever	1
Undulant fever	2
Vincent's infection	7
Whooping cough	1,393

April 1939

	Cases
New Hampshire:	
Chickenpox	15
Mumps	28
Whooping cough	10

May 1939

	Cases
New Hampshire:	
Chickenpox	5
Mumps	15
Whooping cough	2

June 1939

	Cases
Chickenpox:	
Arkansas	59
Connecticut	234
Missouri	79
Conjunctivitis, infectious:	
Connecticut	7
Dysentery:	
Arkansas (amoebic)	80
Arkansas (bacillary)	118
Connecticut (bacillary)	3
Missouri (bacillary)	1
German measles:	
Arkansas	4
Connecticut	9
Hookworm disease:	
Arkansas	1
Missouri	1
Mumps:	
Arkansas	66
Connecticut	278
Missouri	196
Ophthalmia neonatorum:	
Arkansas	1
Missouri	1
Puerperal septicemia:	
Arkansas	3
Rabies in animals:	
Arkansas	26

June 1939—Continued

	Cases
Rocky Mountain spotted fever:	
Missouri	1
Septic sore throat:	
Arkansas	28
Connecticut	25
Missouri	6
Tetanus:	
Arkansas	1
Connecticut	1
Missouri	2
Trachoma:	
Arkansas	15
Missouri	58
Trichinosis:	
Arkansas	1
Tularaemia:	
Arkansas	15
Missouri	1
Undulant fever:	
Arkansas	11
Connecticut	11
Missouri	2
Whooping cough:	
Arkansas	97
Connecticut	307
Missouri	76

WEEKLY REPORTS FROM CITIES

City reports for week ended July 1, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	128	37	16	2,673	358	850	10	377	53	1,299	-------
Current week	79	23	9	1,383	236	436	9	330	42	1,301	-------
Maine:											
Portland	0	------	0	0	0	1	0	1	0	0	24
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	5
Manchester	0	------	0	0	1	0	0	0	0	0	23
Nashua	0	------	0	1	0	0	0	0	0	0	8
Vermont:											
Barre	0	------	-------	0	------	0	0	------	0	0	-------
Burlington	0	------	-------	7	0	0	0	0	0	4	2
Rutland	0	------	0	0	0	0	0	0	0	0	9
Massachusetts:											
Boston	0	------	0	98	11	14	0	8	2	16	186
Fall River	0	------	0	1	0	1	0	2	0	1	24
Springfield	0	------	0	4	1	0	0	0	0	0	29
Worcester	0	------	0	18	2	1	0	1	0	19	41
Rhode Island:											
Pawtucket	0	------	0	5	0	2	0	2	0	0	-------
Providence	0	------	0	53	2	4	0	1	0	16	61
Connecticut:											
Bridgeport	0	------	0	7	1	0	0	0	0	1	30
Hartford	1	------	0	6	2	0	0	0	1	10	48
New Haven	0	------	0	67	0	3	0	0	0	12	41
New York:											
Buffalo	0	------	0	85	9	18	0	7	0	15	128
New York	9	1	2	129	44	52	0	73	5	117	1,178
Rochester	0	------	0	42	4	3	0	0	0	2	63
Syracuse	0	------	0	80	1	0	0	0	0	98	51
New Jersey:											
Camden	0	------	0	0	0	3	0	0	0	11	20
Newark	0	------	0	2	0	13	0	1	-------	64	73
Trenton	0	------	0	0	2	6	0	1	0	0	31
Pennsylvania:											
Philadelphia	2	2	2	31	13	18	0	29	1	126	394
Pittsburgh	1	1	1	2	4	8	0	7	1	32	125
Reading	0	------	0	0	2	0	0	2	0	0	20
Scranton	0	------	-------	1	------	2	0	------	0	5	-------
Ohio:											
Cincinnati	6	1	-------	2	------	39	0	------	2	29	110
Cleveland	0	6	0	3	4	20	0	9	0	54	155
Columbus	0	1	1	8	1	1	0	2	0	5	80
Toledo	0	------	0	20	2	10	4	3	0	42	75
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	4	5
Fort Wayne	1	------	0	0	0	3	0	2	0	0	24
Indianapolis	1	------	0	3	2	4	0	2	1	48	88
Muncie	0	------	0	0	0	1	0	1	0	0	8
South Bend	0	------	0	0	1	0	0	0	0	11	14
Terre Haute	0	------	1	0	1	0	0	2	0	0	23
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	3
Chicago	15	------	0	10	14	56	0	38	2	109	630
Elgin	0	------	0	1	0	0	0	1	0	2	9
Moline	0	------	0	0	0	0	0	0	0	0	10
Springfield	0	------	0	0	1	0	0	0	0	18	20
Michigan:											
Detroit	4	------	0	30	7	52	0	9	1	101	222
Flint	0	------	0	7	0	6	0	0	0	1	35
Grand Rapids	0	------	0	2	1	10	0	0	0	1	27
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	4	4
Madison	0	------	0	15	1	1	0	0	0	8	21
Milwaukee	0	------	0	1	6	18	0	1	0	24	68
Racine	0	------	0	3	0	2	0	0	0	14	18
Superior	0	------	0	0	0	0	0	0	0	0	9

City reports for week ended July 1, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	2	0	0	0	0	0	1	29
Minneapolis	0		0	15	1	1	0	1	0	11	94
St. Paul	0		0	5	2	3	0	1	1	17	62
Iowa:											
Cedar Rapids	0			8		0	0		0	0	
Davenport	0			0		0	10		0	0	
Des Moines	0		0	5	0	3	8	0	6	2	40
Sioux City	0			0		1	0		0	0	
Waterloo	0			4		0	0		0	0	
Missouri:											
Kansas City	0		0	1	1	5	0	7	1	1	90
St. Joseph	1		0	0	3	0	0	0	0	0	30
St. Louis	1		0	1	4	6	2	5	3	30	215
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	2	2
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	0	0	0	0	0	10
South Dakota:											
Aberdeen	0			5		0	25		0	0	
Sioux Falls	0		0	0	0	5	0	0	0	0	7
Nebraska:											
Lincoln	0			4		0	0		0	19	
Omaha	0		0	2	2	1	0	4	0	0	58
Kansas:											
Lawrence	0		0	0	1	0	0	0	0	0	6
Topeka	0		0	1	0	1	0	0	0	2	9
Wichita	0		0	1	0	2	0	0	0	2	28
Delaware:											
Wilmington	0		0	1	0	1	0	0	0	0	24
Maryland:											
Baltimore	1		0	14	2	3	0	11	0	44	153
Cumberland	0		0	0	0	0	0	0	0	2	11
Frederick	0		0	0	0	1	0	0	0	0	2
District of Col.:											
Washington	4		0	77	4	2	0	10	0	29	147
Virginia:											
Lynchburg	2		0	13	2	0	0	1	1	22	11
Norfolk	0		0	0	0	1	0	0	0	0	18
Richmond	0		0	22	3	0	0	1	1	0	43
Roanoke	0		0	0		1	0	0	0	0	17
West Virginia:											
Charleston	0		0	0	1	0	0	0	1	0	8
Huntington	0			0		0	0		0	0	
Wheeling	0		0	3	0	1	0	0	1	1	18
North Carolina:											
Gastonia	0			0		0	0		0	0	
Raleigh	0		0	0	1	0	0	0	0	8	16
Wilmington	0		0	0	1	0	0	0	0	1	14
Winston-Salem	0		0	0	0	0	0	1	0	3	18
South Carolina:											
Charleston	0		0	0	1	1	0	1	2	0	27
Florence	0		0	0	1	0	0	1	0	0	8
Greenville	0		0	0	0	0	0	0	0	0	12
Georgia:											
Atlanta	0	3	1	0		2	0	3	0	0	84
Brunswick	0		0	0	0	0	0	0	1	0	3
Savannah	1	2	0	0	8	0	0	1	0	11	30
Florida:											
Miami	0	2	1	0	8	0	0	8	0	3	34
Tampa	0		0	15	0	0	0	1	0	1	20
Kentucky:											
Ashland	0		0	0	1	0	0	0	0	0	7
Covington	0		0	1	2	0	0	0	0	0	12
Lexington	0		0	0	1	0	0	1	0	0	20
Louisville	1		0	1	3	3	0	4	0	14	74
Tennessee:											
Knoxville	0		1	1	2	1	0	2	1	4	30
Memphis	0		0	0	4	4	0	8	2	71	76
Nashville	0		0	1	3	0	0	5	2	11	55
Alabama:											
Birmingham	0		0	0	1	0	0	5	0	1	59
Mobile	0		0	0	0	0	0	2	0	0	15
Montgomery	0			0		1	0		0	2	

City reports for week ended July 1, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	0	0	1	0	0	2	1	0	3
Louisiana:											
Lake Charles	1	------	0	0	0	0	0	0	0	0	8
New Orleans	2	------	0	11	7	4	0	9	2	1	141
Shreveport	0	------	0	0	6	0	1	4	3	0	46
Oklahoma:											
Oklahoma City	0	3	0	0	3	1	0	2	0	0	43
Tulsa	0	------	------	1	------	3	1	------	0	0	------
Texas:											
Dallas	2	------	0	14	1	0	0	1	0	0	57
Fort Worth	0	------	0	5	2	4	0	0	0	0	24
Galveston	0	------	0	0	3	0	0	0	0	0	11
Houston	1	------	0	1	7	1	0	3	3	4	77
San Antonio	1	------	1	0	2	0	0	7	0	0	64
Montana:											
Billings	0	------	0	1	2	0	0	0	0	0	13
Great Falls	0	------	0	36	0	0	0	0	0	0	16
Helena	0	------	0	1	1	0	0	0	0	0	4
Missoula	0	------	0	0	0	0	0	1	0	0	7
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	9
Colorado:											
Colorado Springs	0	------	0	0	1	4	0	1	0	1	9
Denver	8	------	0	11	2	6	0	2	0	10	62
Pueblo	4	------	0	3	0	0	0	1	0	6	8
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	2	0	0	8
Utah:											
Salt Lake City	0	------	0	4	2	1	6	0	0	26	39
Washington:											
Seattle	0	------	0	286	1	1	0	6	0	5	93
Spokane	0	------	0	21	1	1	0	0	0	0	21
Tacoma	0	------	0	9	2	0	0	0	0	0	22
Oregon:											
Portland	1	------	0	7	2	2	0	2	0	4	69
Salem	0	------	------	5	------	0	0	------	0	0	------
California:											
Los Angeles	4	6	0	145	6	27	0	19	0	17	282
Sacramento	5	------	0	16	0	1	0	1	0	0	20
San Francisco	2	------	0	6	3	2	0	8	1	2	130

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				South Carolina:			
New York	1	0	0	Charleston	0	0	3
New Jersey:				Georgia:			
Camden	0	0	1	Atlanta	0	0	1
Ohio:				Tennessee:			
Cincinnati	1	0	0	Nashville	0	0	1
Michigan:				Arkansas:			
Detroit	0	0	1	Fort Smith	1	0	0
North Carolina:				California:			
Wilmington	1	0	0	Los Angeles	0	0	3
				San Francisco	0	1	0

Pellagra.—Cases: Boston, 1; Baltimore, 3; Lynchburg, 1; Atlanta, 1; Savannah, 4; New Orleans, 2; Dallas, 1.

Typhus fever.—Cases: New York, 2; Charleston, S. C., 1; Brunswick, 1; Mobile, 1; Montgomery, 1.—Deaths: Atlanta, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended June 17, 1939.—During the week ended June 17, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	1	2					4
Chickenpox		2		77	215	43	15	19	60	431
Diphtheria		5		32		3		1		41
Dysentery				1	1					2
Influenza		7			3		1		47	58
Lethargic encephalitis									1	1
Measles		5	1	754	720	50	14	6	20	1,570
Mumps				21	74	35		2	9	141
Pneumonia		3			18				6	27
Poliomyelitis				1	1					2
Scarlet fever		2	10	40	80	15	6	14	9	182
Smallpox							1			1
Tuberculosis	3	2	12	88	50	6		3		164
Typhoid and paratyphoid fever		2		15	2	1	1	1	1	23
Whooping cough		7		84	81	9	18	9	51	259

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for June 30, 1939, pages 1182–1194. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China.—During the week ended July 1, 1939, cholera was reported in China as follows: Hong Kong, 97 cases; Macao, 95 cases.

Iran—Sistan Region—Zabol.—During the week ended July 1, 1939, 10 cases of cholera were reported in Zabol, Sistan Region, Iran.

Plague

Brazil.—During the month of March 1939, plague was reported in Brazil as follows: Alagoas State, 11 cases, 3 deaths; Bahia State, 1 case; Pernambuco State, 5 cases, 2 deaths.

Peru.—During the month of May 1939, plague was reported in Peru as follows: Lambayeque Department, 1 case; Libertad Department, Trujillo city, 3 cases; Piura Department, 7 cases, 1 death.

Smallpox

Society Islands—Tahiti—Papeete.—During the week ended July 8, 1939, 12 suspected cases of smallpox with 1 death were reported in Papeete, Tahiti, Society Islands.

Yellow Fever

Brazil—Para State—Capanema.—On May 23, 1939, 1 death from the jungle type of yellow fever was reported in Capanema, Para State, Brazil.

Colombia—Department of Antioquia—Caracoli.—On May 29, 1939, 1 death from yellow fever was reported in Caracoli, Department of Antioquia, Colombia.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

PREVALENCE OF DISEASE

Public Health Reports

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PREVALENCE OF POLIOMYELITIS

For the week ended July 22, a total of 137 cases of poliomyelitis was reported in the United States, as compared with 143 cases for the preceding week, and with 227 cases for the 5-year median.

The largest decreases in incidence were shown for South Carolina, where the number of cases dropped from 20 to 12, and for Texas, where it decreased from 15 to 7 as compared with the preceding week. The largest increases were shown for Michigan (from 5 to 17 cases), Pennsylvania (from 0 to 5), and California (from 45 to 51). Of the cases occurring in California, Los Angeles reported only 6 and San Diego 2.

The decrease for the current week in the number of cases for the country as a whole cannot be interpreted to mean that the seasonal peak for poliomyelitis has been reached, as that peak usually comes later. The general situation remains favorable, however, as the current incidence is well below the 5-year median.

ANOPHELINE BREEDING: SUGGESTED CLASSIFICATION OF PONDS BASED ON CHARACTERISTIC DESMIDS[1]

By W. C. Frohne, *Associate Limnologist, United States Public Health Service*

INTRODUCTION

Such classifications as may now exist of small bodies of standing fresh water are of limited utility to the practical malariologist seeking to correlate habitat and anopheline production. The vague biological concepts conveyed by the terms "borrow pit," "fish pond," and "reservoir"—terms of predilection of the sanitary engineer—are scarcely less elastic and indiscriminate than those of the naturalist, such as "swamp," "marsh," and "bog." As a result, those otherwise invaluable larval collection data, gathered over more than a quarter of a century of antimalaria activity, cannot be used to define accurately the ecological requisites of any of the American species of *Anopheles*. This paper proposes a preliminary natural classification based on a

[1] From the Henry R. Carter Memorial Laboratory, Malaria Research, Division of Infectious Diseases, National Institute of Health, Savannah, Georgia.

year's study of pond microbiotas with particular reference to the desmids. The areas investigated are in South Carolina and Georgia within approximately 100 miles of Savannah, Ga.

The term "pond" as used in this paper applies to relatively shallow bodies of quiet water, naturally or artificially impounded, and occupied more or less by the larger plants. Adherence to this usage eliminates misunderstanding and focuses attention on real biological differences, rather than on distinctions of name. In Europe, detailed studies (e. g., Nordquist, cited by Thienemann, 1925) of biological and physical-chemical differences have provided information allowing application of the trophic classification of lakes, so that certain Old World ponds may be classed as eutrophic, oligotrophic, or dystrophic. Further subdivision, especially of the dystrophic (bog) type, has received wide recognition. It is hoped that the following data on the desmids may provide a beginning for a natural classification of the standing fresh waters of the southeastern United States.

Desmids are one-celled or colonial grass-green algae composing two (or three) families of the order Zygnematales. They appear especially suitable as possible indicator organisms of habitat types of this study for the following reasons: (1) Shallow, weedy ponds are a preferred habitat; (2) the greater number of species occurs in colored waters ranging in reaction between pH 5 and 6 (like the majority of ponds in the region investigated); (3) species of desmids are known from virtually all fresh-water habitats; (4) the genera may usually be identified at a glance and the species are recognizable on the basis of size and shape of the resistant cell wall. An additional point of interest in the desmids for the malariologist lies in the recovery of many species from guts of anopheline larvae.

METHODS OF STUDIES

Three methods of obtaining representative samples of desmids were used: (1) Straining surface water through a No. 25 bolting-cloth plankton net; (2) putting out a slide rack as described by Miller(1936) for various periods; (3) wringing larger plants and detritus into the collection jar. The first two methods were expected to make possible a rough separation of planktonic and periphyton species. This expectation was not fulfilled, and since the simple third method furnished all the forms found by use of the other two, it was adopted as standard practice. Samples were examined alive within a few days after collection and a portion of each was preserved in formalin for further reference. With each collection, air and surface water temperatures were taken and the reaction was determined by Hellige

or La Motte colorimeters. In a few ponds with decidedly variable pH, and generally in the larger ponds, 6 to 10 stations were established where separate collections were made. All desmids were drawn with the aid of a camera lucida and measured with an ocular micrometer. Anopheline larvae were regularly dipped if present, and a cumulative list of the higher aquatic plants of each pond was prepared.

Systematic treatment of the desmids is reserved for a later paper. Only a few general data are essential at this time. Twenty-seven genera have been listed by Smith (1933) from the United States; only three of these, *Roya*, *Docidium*, and *Oöcardium*, were not found in the present study. Determination of *Phymatodocis*, a rare genus which was encountered, was kindly confirmed by Prof. W. R. Taylor, of the University of Michigan. About 155 species are considered from 26 ponds investigated. Although only slightly more than one-half are as yet satisfactorily identified, all chosen are believed to be distinct enough for recognition in the slightly different forms of the various ponds.

PONDS

In tables 1 and 2 are summarized some general data descriptive of the 26 ponds. Both ponds and data are, of course, selected, the data with a view to emphasizing variations in reaction and the ponds to represent somewhat equally the different parts of the pH scale. An attempt was made to weight results by the choice of ponds in three independent watersheds. In table 2 the characteristic higher plants are referred to by the number given in table 1, which is a general list of the most common species in these ponds. Morphometric data have been omitted. Except pond A (about one-thirtieth acre), all the ponds usually exceed one-fifth of an acre and the area of pond R at high level amounts to more than 5 square miles. The artesian-well ponds as a class are rather small, less than an acre, except ponds C, Y, and Z.

TABLE 1.—*Partial list of prominent aquatic plants of 26 ponds in coastal Georgia and South Carolina, 1938*

1. *Acer rubrum* L.
2. *Alnus* sp.
3. *Aralia spinosa* L.
4. *Bidens* sp.
5. *Brasenia Schreberi* Gmel.
6. *Cabomba caroliniana* Gray.
7. *Carex* spp.
8. *Castalia odorata* (Ait.) Woodville and Wood.
9. *Cephalanthus occidentalis* L.
10. *Ceratophyllum demersum* L.
11. *Cornus florida* L.
12. *Cyperus* spp.
13. *Drosera brevifolia* Pursh.
14. *Echinodorus radicans* (Nutt) Engelm.
15. *Eleocharis quadrangulata* (Michx.) R. and S.
16. *Eleocharis tuberculosa* (Michx.) R. and S.
17. *Elodea* sp.
18. *Eriocaulon* sp.
19. *Hydrochloa caroliniensis* Beauv.
20. *Hydrocotyle umbellata* L.
21. *Iris*, sp.
22. *Juncus scirpoides* Lam.
23. *Juncus* sp.
24. *Lecticula resupinata* (Greene) Small (?).
25. *Lemna minima* Phillppi.
26. *Lemna minor* L.
27. *Limnobium Spongia* (Bosc.) Richard.
28. *Liquidambar Styraciflua* L.
29. *Liriodendron tulipifera* L.
30. *Ludvigia* (?) sp.
31. *Magnolia* sp.
32. *Mayaca Aubletii* Michx.
33. *Myriophyllum pinnatum* Walt.
34. *Nelumbo lutea* (Willd.) Pers.
35. "Newington grass." [1]
36. *Nymphaea advena* Ait.
37. *Nymphoides aquaticum* (Walt.) Small.
38. *Nymphoides lacunosum* (Vent.) Small.
39. *Nyssa sylvatica biflora* (Walt.) Sarg.
40. *Orontium aquaticum* L.
41. *Oryza sativa L.*
42. *Pallavicinia Lyellii* (Hook) S. F. Gray.
43. *Peltandra* sp.
44. *Proserpinaca* sp.
45. *Pinus taeda* L.
46. *Polygonum* spp. (includes *Persicaria*).
47. *Pontederia cordata* L.
48. *Pontederia lanceolata* Nutt.
49. *Potamogeton diversifolius* Raf.
50. *Potamogeton* sp.
51. *Quercus* spp.
52. *Rhexia lutea* Walt.
53. *Rhexia* spp.
54. *Rhynchospora corniculata* (Lam.) Gray.
55. *Rhynchospora* spp.
56. *Ricciocarpus natans* (L.) Corda (?).
57. *Sagittaria* spp.
58. *Salix* sp.
59. *Sarracenia flava* L.
60. *Sarracenia minor* Walt.
61. *Sarracenia psittacina* Michx.
62. *Sassafras officinale* Nees and Eber.
63. *Saururus cernuus* L.
64. *Sclerolepis uniflora* (Walt.) B. S. P.
65. *Sparganium* sp.
66. *Sphagnum* spp.
67. *Taxodium ascendens* Brongn.
68. *Taxodium distichum* (L.) L. C. Rich.
69. *Typha angustifolia* L.
70. *Typha latifolia* L.
71. "Unidentified aquatic moss."
72. *Utricularia inflata* Walt.
73. *Utricularia radiata* Small.
74. *Utricularia* spp.
75. *Vallisneria spiralis* L.
76. *Wolffiella floridana* (J. D. Sm.) Thompson.
77. *Xyris* spp.
78. *Zizaniopsis miliacea* (Michx.) Döll and Asch.
79. *Chara* sp.
80. *Nitella* sp.
81. *Piaropus crassipes* (Mart.) Britton.
82. *Azolla caroliniana* Willd.

[1] Unidentified submerged aquatic.

TABLE 2.—*Source and appearance of water, light conditions, reaction, station individuality, higher plants, and anopheline breeding characteristic of 26 ponds located in coastal Georgia and South Carolina, 1937–38*

General	Date of visits	Reaction	Station individuality	Biotic
A. ALTAMAHA HILLSIDE POOL, WAYNE COUNTY, GA.				
[Desmid-rich class, type unsettled]				
Source: Seepage and run-off. Shade: Great; large trees. Appearance: Whitish; turbid with clay.	Aug. 12, 1938 Sept. 22, 1938	6.1 5.6	Presumably slight in this small pool, about 25 feet square.	Higher plants: 12, 30, 35. Anopheline breeding: *A. punctipennis* (Say).
B. BETHESDA CHURCH POND, EFFINGHAM COUNTY, GA.				
[Desmid-rich class; *Sphagnum* type]				
Source: Seepage and run-off; sandy district. Shade: Open along road, bushes dense in background. Appearance: Brown.	Apr. 11, 1938 June 26, 1938	4 (?) 4 (?)	Not investigated; presumably considerable.	Higher plants: 20, 35, 46, 48, 68. Anopheline breeding: *A. crucians* Wiedemann.
C. BOUHAN ARTESIAN POND, CHATHAM COUNTY, GA.				
[Desmid-poor class, exceptional artesian-water type pond]				
Source: Artesian well; some run-off. Shade: Part open; part shaded by scrub willow and cattails. Appearance: Source clear, colorless; locally brownish; slightly turbid.	June 8, 1938 Aug. 4, 1938 Sept. 14, 1938	7.3 7.1	Not studied; presumably great.	Higher plants: 6, 8, 14, 15, 22, 45, 46, 58, 70. Anopheline breeding: *A. quadrimaculatus* Say, *A. crucians*.
D. BUTLER POND, SAVANNAH, CHATHAM COUNTY, GA.				
[Desmid-poor class; artesian-water type]				
Source: Probably artesian well. Shade: Inconsequential; along shore cattails and 1 large willow. Appearance: Colorless; nearly clear.	Apr. 21, 1938 July 20, 1938 Aug. 1, 1938 Oct. 21, 1938	7.1 6.7 6.7 7.4	Not investigated; presumably slight.	Higher plants: 4, 17, 20, 22, 26, 46, 57, 58, 69. Anopheline breeding: *A. quadrimaculatus*, *A. crucians*.

TABLE 2.—*Source and appearance of water, light conditions, reaction, station individuality, higher plants, and anopheline breeding characteristic of 26 ponds located in coastal Georgia and South Carolina, 1937–38*—Continued

General	Date of visits	Reaction	Station individuality	Biotic
E. CONWAY ARTESIAN POND, CHATHAM COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Rather open, little cattail and willow. Appearance: Colorless; nearly clear.	Aug. 16, 1938	8.4	Not studied; presumably slight.	Higher plants: 17, 19, 22, 57, 58, 70, 75. Anopheline breeding: *A. quadrimaculatus*, *A. crucians*.
F. DARIEN ARTESIAN POND, M'INTOSH COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Open. Appearance: Colorless; clear.	Nov. 24, 1937 Jan. 17, 1938 Drained Apr. 15, 1938	8.1 8.4	Slight except in overflow pond.	Higher plants: 8, 22, 47, 79. Anopheline breeding: *A. quadrimaculatus*, *A. crucians*.
G. FOREST POND, NEAR SAVANNAH RIVER MIGRATORY WATERFOWL REFUGE, U. S. BIOLOGICAL SURVEY, JASPER CO., S. C. [Desmid-rich class; desmid-optimum type]				
Source: Seepage; run-off inconsequential. Shade: Partly open; partly half shaded; partly deep shaded. Appearance: Pale amber to brown; clear.	Feb. 15, 1938 Mar. 8, 1938 Mar. 23, 1938 Apr. 7, 1938 July 13, 1938 Aug. 24, 1938 Sept. 30, 1938	5.6 5.7 5.6 5.7 5.9 6.2 5.0	Investigated casually; very slight.	Higher plants: 7, 9, 12, 22, 27, 33, 38, 44, 46, 47, 55, 58, 63, 68, 70, 73, 74. Anopheline breeding: *A. crucians*, *A. quadrimaculatus*.

H. GOSHEN CHURCH POND, EFFINGHAM CO., GA.

[Desmid-rich class; desmid-optimum type]

			Station	pH [1]	pH [2]	Temperature (°C.) [1]	Temperature (°C.) [2]	pH [3]	
Source: Chiefly seepage; some run-off. Shade: Partly open; partly cattail shade; partly shrouded in dense bushes. Appearance: Pale brown to dark brown, clear or slightly turbid.	Feb. 3, 1938	5 0	1	8.0	8.5	30	36	7.1	Higher plants: 1, 8, 16, 19, 20, 22, 23, 25, 48, 55, 63, 66, 70, 72, 73, 74, 77. Anopheline breeding: *A. crucians.*
	Feb. 24, 1938	6.3	2	5.3	5 2	27	31	---------	
	June 23, 1938	6.1	3	4(?)	4(?)	25.5	33	4.6	
	Oct. 7, 1938	6.2	4	6.6	7.9	29.5	34 5	---------	
			5	6.2	6.5	32	34 5	---------	
			6	6.6	8.4	31	33	6.2	
			7	6 5	6 5	31.5	33	---------	
			8	6.0	6 1	28	29	6.2	
			9	6.8	7.1	32	32	---------	

I. GWINNETT POND, SAVANNAH, CHATHAM CO., GA.

[Desmid-poor class; temporary desmid-poor type]

Source: Run-off; seepage secondary. Shade: Open, tree on north shore; tall weeds on east shore. Appearance: Colorless; fairly clear.	Oct. 29, 1937	7.1	Weedy and open regions probably moderately dissimilar.	Higher plants: 33, 70. Anopheline breeding: *A. quadrimaculatus.*
	Dec. 20, 1937	7 2		
	Jan. 27, 1938	8.0		

J. LOTUS POND, SAVANNAH RIVER MIGRATORY WATERFOWL REFUGE, JASPER CO., S. C.

[Desmid-rich class; desmid-optimum type]

			Station	pH [4]	pH [5]	Temperature (°C.) [4]	Temperature (°C.) [5]	
Source: Remote seepage runs in occasionally at north end. Shade: Open; station 1 shaded by pine. Appearance: Colorless to faint brown; often turbid, but only at south end.	Oct. 25, 1937	5.4	1	6.0	6.6	22 5	31	Higher plants: 5, 8, 11, 13, 15, 19, 22, 28, 31, 34, 39, 49, 51, 55, 62. Anopheline breeding: *A. crucians.*
	Nov. 15, 1937	5.4	2	5.9	6.2	26	31	
	Feb. 15, 1938	5.8	3	5.3	5.8	27.5	31	
	Apr. 6, 1938	6.0	4	6.2	6.7	29	29.5	
	Apr. 18, 1938	6.6	5	6 3	6.8	25.5	29	
	July 13, 1938	5.9	6	6.8	6.8	25	29	
	Aug. 24, 1938	5.4	7	7.0	6.9	28	27.5	
	Sept. 30, 1938	5.4	8	6.8	6.8	26	28	

[1] At 10 to 11:30 a. m. on May 11, 1938. [2] At 3:15 to 4 p. m. on May 11, 1938. [3] At noon on Oct. 7, 1938. [4] At 11 a. m. to noon on Apr. 18, 1938. [5] At 4 to 5 p. m. on Apr. 18, 1938.

Table 2.—*Source and appearance of water, light conditions, reaction, station individuality, higher plants, and anopheline breeding characteristic of 26 ponds located in coastal Georgia and South Carolina, 1937–38*—Continued

General	Date of visits	Reaction	Station individuality			Biotic
K. MAGNOLIA SPRING POND, JENKINS COUNTY, GA. [Desmid-poor class; artesian-water type]						
			Station	pH [6]	Temperature (° C.) [6]	
Source: Spring; run-off inconsiderable. Shade: Open, shaded in dense *Bidens*-bed. Appearance: Bluish; crystal-clear.	Nov. 3, 1937	6.8	1	6.8	20	Higher plants: 2, 4, 12, 20, 23, 25, 28, 30, 33, 36, 46, 58, 63, 65, 70, 71. Anopheline breeding. *A. punctipennis*, *A. quadrimaculatus*, *A. crucians*.
	Jan. 20, 1938	6.8	2	6.8	22	
	Apr. 13, 1938	6.8	3	6.9	22	
	May 18, 1938	6.8	4	7.0	23	
	June 27, 1938	6.8	5	6.8	23.5	
	Aug. 8, 1938	6.9	6	6.8	29	
	Oct. 13, 1938	6.8				
L. MAGNOLIA SPRING HATCHERY LIMESINK, JENKINS COUNTY, GA. [Desmid-poor class; *Closterium*-euglenoid type]						
Source: Run-off; no evidence of seepage. Shade: Oppressive in this 40-foot deep wooded depression. Appearance: Colorless to greenish; clear or turbid.	Nov. 3, 1937	6.8	Virtually none.			Higher plants: 3, 25, 36. Anopheline breeding: *A. crucians*, *A. quadrimaculatus*.
	Jan. 20, 1938	6.8				
	Apr. 13, 1938	6.2				
	May 18, 1938	6.8				
	June 27, 1938	6.8				
	Aug. 8, 1938	6.4				
	Oct. 13, 1938	6.7				
M. MAGNOLIA SPRING HATCHERY PONDS,[7] JENKINS COUNTY, GA. [Desmid-poor class; artesian-water type]						
			Pond	pH [9]		
Source: Magnolia Spring; run-off a minor source. Shade: Generally open; partly shaded on some shores. Appearance: Colorless; clear.	Sept. 2, 3, 1937	[8] 7.0–8.3	1	8.0		Higher plants: 2, 10, 12, 23, 25, 30, 33, 36, 46, 50, 54, 57, 58, 63, 67, 70, 75. Anopheline breeding: *A. quadrimaculatus*, *A. crucians*.
	Nov. 3, 1937	7.5	2	8.3		
	Apr. 13, 1938	6.8	3	7.0		
	June 27, 1938	6.9	4	7.4		
	Aug. 8, 1938	8.4	5	8.0		

N. MOREHOUSE ARTESIAN POND, LIBERTY COUNTY, GA.

[Desmid-poor class; artesian-water type]

Source: Artesian well. Shade: Open. Appearance: Colorless; clear.	July 25, 1938	7.8	Not studied.	Higher plants: 20, 22, 46, 70, 81. Anopheline breeding: *A. crucians*.

O. NEWINGTON POND, SCREVEN COUNTY, GA.

[Desmid-rich class; desmid-optimum type]

			Station	pH[10]	pH[11]	Temperature (° C.)[10]	Temperature (° C.)[11]	
Source: Seepage from a filled spring ¼ mile east; little run-off. Shade: Center open, considerable gum tree shade along margins. Appearance: Colorless to brown; clear (but turbid near road from livestock).	Nov. 2, 1937	5.5	1	6.0	6.2	28	34.5	Higher plants: 1, 20, 29, 31, 33, 35, 37, 39, 45, 49, 73, 74. Anopheline breeding. *A. crucians*.
	Feb. 3, 1938	6.0	2	5.7	6.1	27	36.5	
	Feb. 24, 1938	5.8	3	5.6	6.1	33.5	37.5	
	May 6, 1938	5.6	4	5.0	5.2	37	36	
	July 22, 1938	6.1	5	5.0	5.5	24.5	32.5	
	Sept. 27, 1938	Dry	6	5.7	6.1	33	31.5	
			7	5.9	6.3	27.5	31.5	

P. RICE FIELD ON SAVANNAH RIVER MIGRATORY WATERFOWL REFUGE, JASPER COUNTY, S. C.

[Desmid-rich class; temporary desmid-rich type]

Source: Canal, itself fed by seepage and river. Shade: Great in rice and *Zizaniopsis*; slight along ditches. Appearance: Pale brown to deep brown; turbid to very turbid.	Aug. 1, 1938 Aug. 11, 1938 Aug. 29, 1938 Sept. 30, 1938	5.6 6.1 6.1 6.0	Fortnightly fluctuation of water level probably prevents pronounced local differences.	Higher plants: 12, 30, 41, 46, 48, 74, 78. Anopheline breeding: *A. crucians*.

[6] On May 18, 1938.
[7] 5 flowing ponds, current scarcely perceptible, in a series, the fifth private property.
[8] Not always taken at same station, hence not directly comparable.
[9] On Sept. 2 and 3, 1937.
[10] At 1:30 to 2:30 p. m. on May 6, 1938.
[11] At 1 to 1:30 p. m. on July 22, 1938.

TABLE 2.—*Source and appearance of water, light conditions, reaction, station individuality, higher plants, and anopheline breeding characteristic of 26 ponds located in coastal Georgia and South Carolina, 1937–38*—Continued

General	Date of visits	Reaction	Station individuality	Biotic
Q. RINCON FOREST STREAM POND, EFFINGHAM COUNTY, GA. [Desmid-rich class; temporary desmid-rich type]				
Source: Intermittent woodland stream which overflows along highway Shade: Open, source in deep gloom. Appearance: Brown to dark-brown, turbid or nearly clear.	Feb. 3, 1938 Feb. 24, 1938 [12] July 22, 1938 Oct. 21, 1938	4.7 5.2 4.6 5.7	Not studied, probably slight.	Higher plants: 9, 21, 30, 39, 46, 50, 66. Anopheline breeding: *A. crucians*.
R. RUSHING POND, BULLOCH COUNTY, GA. [Desmid-rich class; desmid-optimum type]				
Source: Stream rising near Statesboro, carrying town sewage, is impounded. Shade: Heavy near shore; cypress half shades more open water. Appearance: Pale brown; clear.	June 1, 1938 Aug. 17, 1938 Sept. 27, 1938 Oct. 3, 1938	6.6 6.2 6.7 [13] 5.7	Not investigated; probably considerable.	Higher plants: 1, 5, 8, 18, 21, 32, 36, 37, 39, 45, 52, 53, 59, 60, 61, 64, 66, 67, 74, 77. Anopheline breeding: *A. quadrimaculatus*, *A. crucians*.
S. SAVANNAH WATERWORKS POND, CHATHAM COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Open; very slight shade from cannas along margins. Appearance: Greenish or colorless, clear.	Sept. 16, 1938 Oct. 31, 1938	8.4 8.5	Virtually none.	Higher plants: 19, 50. Anopheline breeding: None.

T. SEQUOIA POND, BRYAN COUNTY, GA.

[Desmid-rich class; desmid-optimum type]

			Station	pH [14]	pH [15]	pH [16]	Temperature (°C.) [14]	Temperature (°C.) [15]	Temperature (°C.) [16]	
Source: Seepage into a railroad borrow pit and black gum swamp; run-off from sandy area. Shade: Open; station 8 heavily shaded by gums. Appearance: Pale brown to brown; clear or slightly turbid.	Nov. 24, 1937	5.6	1	6.0	5.9	5.5	27	31	32	Higher plants: 1, 5, 7, 8, 19, 20, 22, 26, 39, 47, 55, 56, 58, 63, 74, 76, 77. Anopheline breeding; *A. crucians*, *A. quadrimaculatus*.
	Dec. 20, 1937	5.8	2	5.8	6.1	5.8	25.5	29	34.5	
	Jan. 17, 1938	5.8	3	5.6	5.7	Dry	23.5	28	Dry	
	Mar. 31, 1938	5.8	4	6.0	5.9	5.4	28.5	31	36.5	
	May 3, 1938	6.0	5	5.6	5.5	5.1	25.5	27	36	
	June 13, 1938	5.5	6	5.6	5.8	5.0	29	31.5	35.5	
	July 25, 1938	5.8	7	5.7	5.9	5.5	27.5	32	33	
	Oct. 8, 1938	5.4	8	5.8	5.7	Dry	23	23.5	Dry	
			9	------	------	5.9	----------	----------	21.5	

U. SOUTH MAGNOLIA SPRING LIMESINK, JENKINS COUNTY, GA.

[Desmid-rich class; desmid-optimum type]

Source: Run-off, largely by ditch from clay-sand field at southwest. Shade: Moderate from depression, and trees, bushes. Appearance: Colorless or pale brownish; clear or slightly turbid.	Nov. 3, 1937	5.4	Not studied; some expected.	Higher plants: 1, 7, 9, 12, 20, 28, 42, 45, 46, 51, 66, 74, 77. Anopheline breeding: *A. crucians*.
	Jan. 20, 1938	5.8		
	Apr. 13, 1938	6.0		
	May 18, 1938	6.5		
	June 27, 1938	5.8		
	Aug. 8, 1938	5.6		
	Oct. 13, 1938	5.4		

V. TOWER CANAL, SAVANNAH RIVER MIGRATORY WATERFOWL REFUGE, JASPER COUNTY, S. C.

[Desmid-rich class; temporary desmid-rich type]

Source: Seepage and river overflow. Shade: Open: gloomy in *Zizaniopsis* stand. Appearance: Brown to dark brown; turbid to very turbid.	July 13, 1938	6.0	Not investigated.	Higher plants: 6, 14, 24, 36, 40, 43, 46, 47, 50, 57, 68, 78. Anopheline breeding: *A. walkeri*, *A. crucians*, *A. quadrimaculatus*.
	Aug. 1, 1938	6.0		
	Aug. 11, 1938	6.0		
	Sept. 30, 1938	5.9		

[12] Dry in May and June.
[13] After heavy rains.
[14] At 10:30 to 11:15 a. m., on May 3, 1938, air temperature 31.5° C.
[15] At 3:30 to 4:15 p. m., on May 3, 1938, air temperature 29.5° C.
[16] At 10:15 to 11:15 a. m., on June 13, 1938, air temperature 31.5° C.

TABLE 2.—*Source and appearance of water, light conditions, reaction, station individuality, higher plants, and anopheline breeding characteristic of 26 ponds located in coastal Georgia and South Carolina, 1937–38*—Continued

General	Date of visits	Re-action	Station individuality	Biotic
W. TRAVIS ARTESIAN WELL POND, CHATHAM COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Open: connected ditches shaded by pines Appearance: Colorless: clear.	Nov. 22, 1937 Mar. 7, 1938 Mar. 11, 1938 Apr. 22, 1938 Oct. 14, 1938	7.4 8.4 (?) 8.5 8.5	Not studied; probably slight.	Higher plants: 8, 20, 21, 22, 33, 34, 46, 47, 71. Anopheline breeding: *A. quadrimaculatus, A. crucians.*
X. TYPHA-AZOLLA ARTESIAN WELL POND, M'INTOSH COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well; run-off via ditch. Shade: Partly open; partly shade of dense cat-tails. Appearance: Colorless; clear.	July 25, 1938	8.2	Not studied.	Higher plants: 8, 20, 69, 82. Anopheline breeding: *Anopheles* sp.
Y. WAYS HATCHERY, SOUTHEAST POND, BRYAN COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Open. Appearance: Colorless; clear.	Aug. 4, 1938	8.3	Not studied; probably slight.	Higher plants: 57, 79. Anopheline breeding: *A. quadrimaculatus.*
Z. WAYS HATCHERY, SOUTHWEST POND, BRYAN COUNTY, GA. [Desmid-poor class; artesian-water type]				
Source: Artesian well. Shade: Open; some shade by *Echinodorus.* Appearance: Colorless; clear.	Aug. 4, 1938	7.3	Not studied; probably slight.	Higher plants: 14, 57, 69, 80 Anopheline breeding: *A. quadrimaculatus.*

PERMANENCE

The ponds listed, except I, P, and Q, must be considered permanent. An annual fluctuation in water level of as much as 18 inches in those ponds not produced by human agency results in extensive temporary margins, exceeding, occasionally, the areas of the ponds at low level. An artesian well pond varies little seasonally in depth and size.

The summer of 1938 was unusually dry, and ponds O and Q dried up completely. Nevertheless, neither is, from a biotic point of view, temporary. The former, Newington Pond, has a microbiota similar to and as rich as comparable permanent waters. The other pond that goes dry no doubt does so almost every year; yet it, too, may not be classed with temporary waters described in the literature, except roughly with a type proposed by Spandl in 1925 (cited by Thienemann, 1925).[2] An inlet or a stream apparently replenishes its plankton (and periphyton) with forms characteristic of permanent habitats. Only pond I which is dry the greater part of a normally wet year, is typically temporary, judged by the microbiota.

ANOPHELINE BREEDING

The information included on anopheline breeding is not regarded as important in characterizing ponds; it is of interest to malariologists as suggestive of the marked differences in environmental resistance to the several *Anopheles* species by the various pond types. The data indicate, as Boyd (1929) has shown, that *Anopheles quadrimaculatus* prefers a neutral or alkaline habitat, *A. crucians* an acid or neutral one. Quantitative data and seasonal notes on the occurrence of anopheline larvae are omitted from the tables summarizing pond characteristics, since this is a subject not related to pond type and involving extrinsic factors in the ecology of the adult insects. For example, a decided preference for small ponds isolated from other waters, which is suggested by larval counts, may result from lack of other acceptable breeding places, from presence of favorable resting places for adults, from proximity of available blood meals, or from other less obvious environmental requirements of the adult mosquito. Wholly aquatic organisms reflect differences in aquatic habitats, as a rule, better than forms with terrestrial stages.

SIGNIFICANCE OF PLANTS

The higher aquatic plants, which are partially listed in table 1, are of value as indicators of habitat only in a general way. Some time ago Pond (1918) pointed out that we do not know to what extent chemical factors are concerned in the distribution of fresh-water plants, and

[2] Described as follows: "Vorübergehende Gewässer, entstanden durch Überschwemmungen eines Flusses. Die fraglichen Wasseransammlungen liegen im Inundationsgebiete des Flusslaufes. Die Zeit der Wasserführung ist zumeist das Frühjahr, seltener der Herbst. In vereinzelten Fällen (Unwetterskatastrophen) auch der Sommer."

the late Will Scott (1910) suggested that ponds receive accidental co onization, in which early arrivals become the dominant species. Pond Y and the adjacent pond Z, at the Ways State Fish Hatchery, studied as new ponds, may serve as examples supporting Scott's claim.

The rearing ponds of this hatchery are in all essential respects, except one, similar if not identical. They support different aquatics. Ponds Y and Z were constructed in 1935 in previously cultivated fields and provided with aeration fountains of artesian water. When the hatchery was visited in 1937 a labor gang was removing a dense stand of *Sagittaria* from pond Y. Except *Chara* sp., no other macrophytes were present. In the neighboring pond Z a similar occupation by *Echinodorus radicans* and *Nitella* sp. had taken place. Probably *Chara* and *Nitella* were initial invaders in both ponds. The latter pond also had a few *Typha* (cattails). A third pond into which pond Y empties was choked with *Hydrochloa caroliniensis* and also supported a few plants of *Typha latifolia.* No other species were found. About a year prior to this visit two additional independent ponds had been excavated in which only a few cattails had established themselves.

Although without great significance as index organisms, macrophytes are themselves important ecological factors and must be considered in pond descriptions. They provide shelter for other organisms, affect illumination and circulation, and some of them, for instance *Sphagnum,* have notable chemical influence. The number of species is proportional in a general way to the age of the pond. In extreme habitats, such as pond L with only two aquatics although hundreds of years old, this generalization does not hold. Finally, in some extensive geologically old swamps, as the Wrights (1932) have shown for the Okefenokee, the higher aquatic plants (and trees) have reached a static distribution providing a basis for useful and natural classifications of the habitats.

SUITABILITY OF DESMIDS AS INDEX ORGANISMS

It is proper to inquire further into the premise that desmids are suitable index organisms for ponds. It has already been pointed out that the group is large, is represented in the most varied waters, and that recognition (if not identification) is less troublesome than in the case of other large taxonomic units of pond organisms, such as the higher plants, protozoa, diatoms, blue-green algae, flagellates, rotifers, and the like. Certainly more cogent a reason than assuredness of abundant material and the convenience of the investigator in its determination is the fact that the group contains sensitive indicator species.

Phytoplankton, according to Naumann (1929), is much more difficult to culture than zoöplankton, and successful cultivation of other

than tolerant forms, never a feat of the plant physiologist, was first achieved by the limnologist. It is significant that desmids should be notable among the phytoplankton as difficult to culture. Smith (1924) says, "The artificial culture of desmids is extremely difficult and there are no accurate data on the mineral requirements of the family as there are in the case of the other algae." The planktonic diatoms illustrate this contrast, since a great many of the species have been grown without difficulty in inorganic nutritive solutions. The blue-green algae, like the diatoms, require little more than proper essential food elements. Naumann (1929) reports only quantitative differences in the occurrence of blue-green species in oligotrophic, dystrophic, and eutrophic regions.

There are indications in the literature that desmids introduced into unsuitable waters do not survive. In his study of the algae of Palisades Interstate Park, Smith (1924) describes such a case, as follows: "Little Long Pond is a true desmid lake and one with very few blue-green algae. It might be a natural inference that if the water from this lake were collected in a new lake the plankton organisms in the new and the old lakes would be practically the same, since the old lake is continually introducing its algae into the new lake. In actual practice this has not been the result. Kanahwauke Lake was formed by damming the valley below Little Long Pond and impounding the water of its outlet. The plankton of Kanahwauke consists very largely of *Microcystis* and Phaeoflagellates, with only occasional desmids. The source of the water in the two lakes is the same and the explanation must be sought in the changes taking place in Kanahwauke after its entrance into the lake."

Personal observations, though less conclusive, favor the thesis of the great sensitivity of desmids to the environment. Some observations also indicate surprisingly prompt appearance in suitable new habitats. For example, a concrete aquarium inside a screened insectary for rearing anopheline mosquitoes at the Henry R. Carter Memorial Laboratory maintained a microflora dominated by species of the blue-green *Oscillatoria*. Certain species of diatoms occurred in moderate numbers, and a species of probably *Chlorella* was usually common. Although from time to time during a year and a half larger plants from varied habitats were put in and pond water also added once or twice so that such predators as damsel flies occasionally appeared in numbers, no desmids survived in the tank. This insectary building is protected by a miniature moat a few inches wide. The moat is better lighted than the aquarium and received some rain water, whereas in the insectary aquarium evaporation is replaced with artesian tap water. A small species of *Cosmarium* (a desmid) was a common organism in the moat. Nearby, a small experimental pond, dependent chiefly upon run-off from lawn and fields, retained water

for about three weeks and supported another desmid, a species of *Closterium*. Pond I, about one-quarter mile away, which is natural and temporary, filled up from run-off during the wet fall of 1937 and developed four desmids, *Hyalotheca dissiliens* and three closteria, including *Cl. rostratum*, not collected elsewhere. Whether introduction of algae is, as Smith (1924) proposes, "brought about by the agency of air currents, insects or birds" or by other means it is certain that the common species of desmids appear in a new pond meeting their ecological demands in a remarkably short time.

The tendency of early arrivals to monopolize a habitat has been considered an objection to the use of hydrophytes as indicator organisms. Certain algae, particularly blue greens, "bloom" and doubtless prevent development of other equally suitable species by sheer numbers. Only one desmid, *Cosmarium suevicum*, causes water bloom, according to Smith (1924), and it is exceptional among desmids for one species to become so numerous as to compete spatially with congeners. Thus the desmids appear to be ideal organisms for the investigation of environmental differences in mosquito-breeding areas. To quote Krieger (1933), author of the latest monograph on the desmids, "jede Art ist an ganz bestimmte Milieufaktoren gebunden."

DESMIDS

Tables 3 and 4 give qualitative and quantitative distribution data on the desmids recorded from the ponds included in this paper. However, some species from other waters belonging to pond types proposed below are excluded, even though a few of them are mentioned in the text. The difference in number between total species and species identified comprises well-marked forms not yet specifically determined.

TABLE 3.—*Genera and species of desmids identified or recognized as distinct, from 26 ponds of coastal Georgia and South Carolina, 1937–38*

Pond	Desmids			Pond	Desmids		
	Total genera	Species identified	Total species		Total genera	Species identified	Total species
A. Altamaha Hillside	5	4	10	O. Newington	18	34	47
B. Bethesda Church	8	6	14	P. Ricefield	10	14	27
C. Bouhan's Artesian	7	3	14	Q. Rincon Forest Stream	5	5	13
D. Butler Lumber Co.	3	1	6	R. Rushing	12	22	38
E. Conway Artesian	1	0	2	S Savannah Waterworks	3	1	7
F. Darien Artesian	1	0	1	T. Sequoia	15	30	56
G. Forest	15	29	47	U. S. Magnolia Spring Limesink	14	32	49
H. Goshen Church	14	35	43	V. Tower Canal	7	9	16
I. Gwinnett	2	3	4	W. Travis Artesian	3	0	4
J. Lotus	17	39	59	X. Typha-Azolla Artesian	2	0	3
K. Magnolia Spring	2	0	3	Y. Ways Hatchery S. E. Pond	2	1	5
L. Magnolia Spring Hatchery Limesink	1	0	3	Z. Ways Hatchery S. W. Pond	4	1	5
M. Magnolia Spring Hatchery	4	1	8				
N. Morehouse Artesian	2	0	4				

Table 4.—*Identified genera and species of desmids with their occurrence in 26 ponds (A–Z) of coastal Georgia and South Carolina, 1937–38*

I. *Arthrodesmus:*
   1. *convergens* Ehr. (H).
   2. *Ralfsii* var *Brebissonii* (Racib.) G. M. Smith (T).
II. *Closterium:*
   1. *acerosum* (Shrank) Ehr. (G, I, J).
   2. *angustatum* Ktz (H, J).
   3. *costatum* Corda (G, H, O, Q, R, T, U).
   4. *intermedium* var. *hibernicum* West (T).
   5. *Kuetzingii* DeBreb. (G, H, J, O, R, T, V).
   6. *parvulum* Nag. (H, T).
   7. *rostratum* Ehr. (I).
   8. *setaceum* Ehr. (G, H, J, O, R, T, U).
III. *Cosmarium:*
   1. *amoenum* DeBreb. (J).
   2. *commissurale* var. *crassum* Nordst. (H, J, O, P, U).
   3. *formosulum* Hoff. (O).
   4. *impressulum* Elfv. (T).
   5. *margaritatum* (Lund.) Roy and Biss. (J, R, U, V).
   6. *Meneghinii* var. *nanum* Wille (T).
   7. *Nymannianum* Grun. (T).
   8. *ovale* Ralfs (A, R).
   9. *Portianum* Arch (H, J, O, R).
   10. *pseudoconnatum* Nordst. (C, G, H, J, O, P, Q, R, T, U, Y).
   11. *quinarium* Lund (H).
IV. *Cosmocladium:*
   1. sp. (R).
V. *Cylindrocystis:*
   1. *Brebissonii* Menegh. (J).
VI. *Desmidium:*
   1. *Aptogonum* DeBreb. (G, H, P, Q, V, Z).
   2. *Baileyi* (Ralfs) Nordst. (G, H, J, O, P, T, U).
   3. *Grevillii* (Ktz.) De Bary (G, J, P, U).
VII. *Euastrum:*
   1. *affine* Ralfs (A).
   2. *Didelta* (Turp) Ralfs (G, H, J, O, T).
   3. *evolutum* var. *integrius* W. and G. S. West (A, G, H, J, O, R, T, U, V).
   4. *gemmatum* DeBreb. (O).
   5. *intermedium* Cleve var. *validum* W. and G. S. West (G).
VIII. *Gonatozygon:*
   1. *aculeatum* Hast (G, T).
   2. *pilosum* Wolle (G, P).
IX. *Gymnozyga:*
   1. *moniliformis* Ehr. (B, G, H, J, O, T, U).
X. *Hyalotheca:*
   1. *dissiliens* (Smith) DeBreb. (B, G, H, I, J, P, Q, R, T, U, V).
XI. *Micrasterias:*
   1. *Americana* (Ehr.) Ralfs forma (R).
   2. *apiculata* (Ehr.) Menegh. (U).
   3. *apiculata* var. *fimbriata* (Ralfs) Nordst. (H, T, U).
   4. *apiculata* var. *fimbriata* forma *spinosa* G. M. Smith (G, H, R, T).
   5. *foliacea* Bail (J, R, U).
   6. *laticeps* Nordst. (G, H, P, R, T, U, V).
   7. *Mahabuleshwarensis* Hobson (R).
   8. *muricata* (Bail.) Ralfs (J, O).
   9. *papillifera* DeBreb. forma (U).
   10. *pinnatifida* (Ktz.) Ralfs (G, H, O, T, U).
   11. *radiata* Hass (J, O, P, U).
   12. *radiata* var. *simplex* (Wolle) G. M. Smith (O, U).
   13. *radiosa* Ralfs var. *ornata* forma *elegantior* G. S. West (R).
   14. *radiosa* var. *ornata* Nordst. (G).
   15. *truncata* (Corda) DeBreb. (B, C, H, M, O).
XII. *Netrium:*
   1. *Digitus* (Ehr.) Itz & Roth (G, H, J, O, T, U).
   2. *interruptum* (DeBreb.) Lütkem (U).

TABLE 4.—*Identified genera and species of desmids with their occurrence in 26 ponds (A–Z) of coastal Georgia and South Carolina, 1937–38*—Continued

XIII. *Onychonema:*
  1. *filiforme* (Ehr.) Roy and Biss. (J, R).
  2. *filiforme* forma (H).
  3. *laeve* Nordst. (C, G, J, R, U).
  4. *laeve* forma (H).
  5. *laeve* var. *latum* W. and G. S. West (H).
XIV. *Penium:*
  1. *cucurbitinum* Biss. (B).
  2. *Libellula* (Focke) Nordst. var. *interruptum* W. and G S. West (J).
XV. *Phymatodocis:*
  1. *Nordstedtiana* Wolle (J).
XVI. *Pleurotaenium:*
  1. *Ehrenbergii* (DeBreb.) De Bary (G, H, J, T, V).
  2. *Ehrenbergii* forma (A, D, G, H, J, P, S, U).
  3. *Ehrenbergii* var. *elongatum* W. West (T, U).
  4. *eugeneum* (Turn.) W. and G. S. West (P)
  5. *nodosum* (Bail.) Lund. (H, J, U).
  6. *subcoronulatum* (Turn.) W. and G. S. West var. *detum* W. and G. S. West (G, H).
  7 *Trabecula* (Ehr.) var. *rectum* (Delp.) W. and G. S. West (O).
  8. *trochiscum* W. and G. S. West var. *tuberculatum* G. M. Smith (J, O, U).
XVII. *Sphaerozosma:*
  1. *excavata* Ralfs (H, O, R, U).
  2. *excavata* forma (J, T).
XVIII. *Spirotaenia:*
  1. *condensata* DeBreb. (O, T).
XIX *Spondylosium:*
  1. *planum* (Wolle) W. and G. S. West (O).
XX. *Staurastrum:*
  1. *Arachne* Ralfs (J, U, V).
  2. *Arctiscon* (Ehr.) Lund. var *glabrum* W. and G. S. West (O).
  3. *Cerastes* Lund. (O).
  4. *gladiosum* Turn. (G, H, J, O, P, Q, T, U, V).
  5. *inconspicuum* Nordst. forma (O).
  6. *inconspicuum* var. *crassum* Gay (?) (G, H, J, R, T).
  7. *setigerum* Cleve forma (U).
  8. *subgrande* Borge var. *minor* G. M. Smith (T).
  9. *tetracerum* (Ktz.) Ralfs (J, Y).
XXI. *Tetmemorus:*
  1. *Brebissonii* (Menegh) Ralfs var. *minor* DeBary (B, G, O).
XXII. *Triploceras:*
  1. *gracile* Bail. (J, O).
  2. *verticillatum* Bail. (J).
XXIII. *Xanthidium*·
  1. *antilopaeum* (DeBreb.) Ktz. (H, J, O, P, U).
  2. *antilopaeum* forma (B).
  3. *antilopaeum* var. *minneapoliense* Wolle (G, O, P, R, T, U).
  4. *antilopaeum* var. *polymazum* Nordst. (G, H, J, O, T).
  5. *cristatum* DeBreb. (G, H, J, O).
  6. *cristatum* var. *uncinatum* DeBreb. (H).

POND TYPES

The foregoing is intended as an introduction and to form a basis for the tentative pond classification proposed in this and succeeding paragraphs. The general distribution of 89 identified species or varieties of desmids in the 26 ponds is striking. Twelve ponds each have only 1 or none of these forms; 7 of the 12 ponds have none. These 12, and 2 other ponds which have 3 forms each, will be designated as the "desmid-poor class." The remaining ponds average 21.58 different desmids each; the poorest, a turbid pool, has only 4 identified

species. This pool and 2 temporary ponds lower the average from 26.22 forms per pond. This second group of waters in which desmid species are numerous will hereafter be called the "desmid-rich class." When unidentified forms and species are included and none of the 26 ponds is disregarded, the "desmid-rich class" averages 34.91 species per pond, and the "desmid-poor" only 4.92. This well-marked cleavage of ponds into 2 major habitats based on the occurrence of desmids appears to parallel the demonstration by the Wests in 1903 (cited by Smith, 1924) that the planktons of British lakes similarly belong to either of 2 contrasting types which they have named Baltic (few desmid species) and Caledonian (many desmids). Smith (1933) believes the distinction should be recognized in North American lakes; others have reported lakes of the Baltic and Caledonian types from continental Europe, and from Australia and Africa.

Desmid-rich waters are varied. Those factors, reflected almost invariably by an acid reaction, which combine to favor the occurrence of a large number of desmid genera, exert a marked selective effect on the species. No one desmid species is common to all 12 ponds of this class. Nevertheless, since it seems at this stage more prudent to emphasize similarities than differences, only 3 most clearly distinguishable pond types will be conceded. They will be designated as follows: (1) Sphagnum type; (2) desmid-optimum type; and (3) temporary, desmid-rich type.

The sphagnum type of desmid-rich pond is associated with an extensive mat of the moss, has a fairly acid reaction (pH 4.2 or more), and contains a quantitatively reduced desmid flora. Diatoms are prominent. Pond B alone is classed as belonging to this type, but Billy's Lake of the Okefenokee (pH 3.8), studied from two collections, apparently must be placed in this category. *Xanthidium antilopaeum* occurs as a peculiar forma [3] quite distinct from the species or its two varieties known in seven other desmid-rich habitats. *Penium cucurbitinum* has not been found in other ponds. *Anopheles crucians* is regularly present in small numbers, but larvae of *Anopheles quadrimaculatus* have not been found here.

The desmid-optimum type, which includes the 7 ponds, G, H, J, O, R, T, U, may be recognized by the great variety of genera and species of desmids (an average of 47 species and 15 genera) and by the constant presence of *Closterium setaceum*, *Cosmarium pseudoconnatum*, and *Euastrum evolutum* var. *integrius*. Desmids appear to predominate at all times in these ponds; diatoms, protozoans, and blue-green algae are relatively few. Some of these waters react constantly near pH 6.0; others fluctuate seasonally and by station between approximately pH 5.0 and 7.0. Their waters are colored, at least most of the

[3] This may be a distinct, closely related species.

year. Such ponds are often a favored breeding habitat of *Anopheles crucians*, which species is, however, supplanted or supplemented by relatively small numbers of *A. quadrimaculatus* in the late summer. Minor variations in physico-chemical and biological conditions among desmid-optimum ponds and attendant differences of their desmid floras illustrate sensitivity to environment of many species of this algal group. The distribution in these slightly dissimilar habitats of a large genus might be preferable as a measure of pond individuality; *Micrasterias*, a genus relatively poor in species, has been selected for the sake of brevity and because all species of the genus found have been determined.

TABLE 5.—*Distribution of* Micrasterias *in desmid-optimum ponds of coastal South Carolina and Georgia, 1937–38*

Micrasterias	Pond							Ponds of other types
	G	H	J	O	R	T	U	
M. Americana forma					x			
M. apiculata							x	
M. apiculata var. *fimbriata*		x				x	x	
M. apiculata var. *fimbriata* forma *spinosa*	x	x			x	x		
M. foliacea			x		x		x	
M. laticeps	x	x			x	x	x	P, V.
M. Mahabuleshwarensis					x			
M. muricata			x	x				
M. papillifera							x	
M. radiata			x	x			x	P.
M. pinnatifida	x	x		x		x	x	
M. radiata var. *simplex*				x			x	
M. radiosa var. *ornata*	x							
M. radiosa var. *ornata* forma *elegantior*					x			
M. truncata		x		x				B, C, M.

Pond R (Rushing) is unique in having several species of *Micrasterias* not found in the other ponds. It probably is not mere coincidence that this water is dominated by pond cypress (*Taxodium distichum*) and fringed with bog plants. Three species of pitcher plants (*Sarracenia*), also *Sclerolepis uniflora* and *Mayaca Aubletii*, are common here but absent from the other ponds. In this connection, two other pond cypress waters excluded from this paper also differ somewhat from any desmid-optimum pond investigated. In one of them several unidentified desmids, as well as *Xanthidium armatum* (DeBreb.) Rabenhorst variety, and *Micrasterias torreyi*, Bali., not found in other ponds were among the common species. In table 5 six other forms of *Micrasterias* are reported from only one pond. The table also indicates that *M. truncata* and *laticeps* are more tolerant of environment than the other species of *Micrasterias*. It is perhaps not exceptional that *M. laticeps* occurs in two temporary desmid-rich ponds, but *M. truncata* severely tries the apparent rule of desmid environmental specificity by appearing also in the most acid sphagnum type and the alkaline artesian-water ponds.

Temporary, desmid-rich ponds are associated with the sluggish, coffee-colored intermittent streams or canals prevalent in the coastal region. At high-water stage these drains link up newly submerged borrow pits, ditches, or natural low places and introduce organisms carried from permanent depressions previously isolated. Usually 10 to 15 or more desmids persist, among which closteria and staurastra comprise the majority. This type is even less uniform than the other desmid-rich types, although there are sharply defined subtypes. *Hyalotheca dissiliens* and *Staurastrum gladiosum* are conspicuous common forms of ponds P, Q, and V, which are a selection representing three rather different waters of the type. Temporary ponds similar to Q are widespread in the region in the flood plains of small streams, and the subtype of V, in which *Anopheles walkeri* finds a favorable breeding habitat, is associated with many more or less permanent canals and ditches of the Ogeechee and Savannah valleys. Pond P, a ricefield, must for the present be regarded as a special case.

Desmid-poor permanent ponds are much less common in coastal Georgia and South Carolina than the desmid rich, and their combined area is relatively insignificant. All are nearly neutral or alkaline in reaction. A majority results from the impoundment of artesian-well water. However, as impoundment is a common practice, and since these ponds, which remain moderately warm throughout the winter, are almost invariably located near dwellings, they cannot be ignored by the practical malariologist. Moreover, they are on the increase along the main arteries of motor transport. The State of Georgia and the United States Biological Survey have recently established ponds of this class for rearing game fish and encouraging water-fowl. Not directly due to human agency are the natural alkaline ponds impounded below Magnolia Spring in Jenkins County, Ga., where limestone lies near the surface and a number of limesinks occur. One of the sinks has been described as a typical desmid-optimum pond. Another, pond L, is desmid poor and, unlike the other waters of this class, reacts occasionally as acid as pH 6.2. This type will be called the *Closterium*-euglenoid, since species of *Euglena*, *Trachelomonas*, and *Phacus* are numerically the most important plankters present throughout the year. Three species of *Closterium* which occurred in the October collection were the only desmids. Deficient sunlight seems to be an important factor responsible for the peculiar microbiota. Although this is a very old, permanent, and mud-bottom pond, only *Lemna minima* and *Nymphaea advena* among hydrophytes maintain a precarious footing.

An artesian-water type is proposed for the habitat represented by the 10 ponds, C, D, E, F, N, S, W, X, Y, Z, all artesian-well impoundments, and for Magnolia Spring waters K and M. In all 12 situations a total of only 8 desmid genera occur, viz, *Cosmarium*, *Staurastrum*,

Closterium, *Euastrum*, *Desmidium*, *Pleurotaenium*, *Micrasterias*, and *Onychonema*. The latter 4 genera are not characteristic, rarely present, and then always as the same single species, except *Pleurotaenium*, of which there are 2 species. Further study probably will justify subdivision into subtypes, since no desmid species or even genus is common to all these ponds. On the contrary, each pond appears to provide tolerable conditions for a few different species. Sometimes one of more of these becomes exceedingly abundant as in the instance of a small species of *Staurastrum* in pond S during September and October 1938. Data are too few to judge artesian-water ponds on the composition of the entire microbiota, but while recognizing certain ubiquitous diatoms, protozoans, and such green algae as *Scenedesmus arcuatus* Lemmermann and *Pediastrum tetras* (Ehr.) Ralfs, it is certain that great quantitative differences exist among them. For example, in October 1938 plankton in ponds D, S, and W was dominated by blue-greens, a desmid, and diatoms, respectively. Blue-green algae, though not necessarily the same forms, were most numerous in the other (April, July, August 1938) collections from pond D; and in pond W diatoms or diatoms and protozoans were dominant whenever sampled (November 1937; March, April 1938).

A temporary, desmid-poor type exists in large numbers in the region during wet seasons. These ponds are not associated with streams and their water is colorless and alkaline (or occasionally slightly acid). For such ponds, area and the period elapsed since the rains which produced them might appear to be consequential factors restricting the microbiota. Actually these run-off waters are so dominated by cyst-forming protozoa, microcrustacea, and rotifers that a whole assemblage of characteristic forms appears in the smallest pond almost as soon as it is formed. Desmids are few in kind and number and invariably chiefly different species of *Closterium*. In pond I, included to illustrate the type, *Hyalotheca dissiliens*, and *Closterium rostratum* and *acerosum* were the only desmids found. This quite distinct type of desmid-poor pond is of especial interest as *Anopheles quadrimaculatus* sometimes breeds here in great numbers.

KEY TO POND TYPES

It should be kept clearly in mind when considering a pioneering attempt at classification of habitats that a system will be useful and constructive if it succeeds in being illustrative and representative. Ultimately, and only when detailed ecological studies are available, may such a classification be exhaustive and critical. In this sense and with considerable reservation is proposed the following tentative key to the more obvious pond habitats of the region studied.

Key to pond classes and their types in coastal Georgia and South Carolina

1. (6) Reaction acid (5.2–6.7); water colored; provenience of water chiefly seepage; desmid genera 5 to 18..............Desmid-rich class 2
2. (3) Temporary; associated with stream or canal; 10 to 15 species of desmids, chiefly closteria and staurastra
Temporary desmid-rich type
3. (2) Permanent.. 4
4. (5) Reaction less acid than pH 4.2; desmids dominant group, 14 or more desmid genera, 30 to 60 species among which *Closterium setaceum*, *Cosmarium pseudoconnatum*, *Euastrum evolutum* var. *integrius* are characteristic...............Desmid-optimum type
5. (4) Reaction more acid than pH 4.2; extensive sphagnum marginal areas; diatoms quantitatively more prominent than desmids; *Xanthidium antilopaeum* forma and *Penium cucurbitinum* characteristic
Sphagnum type
6. (1) Reaction alkaline or nearly neutral (pH 6.8–8.6); water virtually colorless; provenience of water subterranean or run-off; desmid genera 1 to 8, usually less than 3..............Desmid-poor class 7
7. (8) Illumination deficient; reaction slightly acid (pH 6.2–6.8); euglenoid plankton dominant; *Closterium* only desmid genus
Closterium-euglenoid type
8. (7) Exposed to direct sunlight; some or all of desmid genera *Closterium*, *Cosmarium*, *Euastrum*, *Staurastrum* present.................. 9
9. (10) Permanent; source subterranean; dominant group of plankton variable, often diatoms, sometimes blue-green algae, rarely a single species of desmid...................Artesian-water type
10. (9) Temporary; water mainly run-off; dominant plankters micro-crustacea, rotifers, and cyst-forming protozoa; closteria constantly present........................Temporary desmid-poor type

DISCUSSION

Ecology is essentially a study of relationships. A few of the more obvious and easily determined relationships have served for the purposes of this classification of ponds, a classification which, it is believed, will facilitate investigation of the relations of pond organisms to their environment, the interrelations of parts of ponds and the whole, succession of pond types, and their stability or mutability, according to vagaries of the environment (particularly weather). The following discussion emphasizes the need for further study. Some desmid-rich waters show marked station individuality. This holds true and may be constant for months (or perhaps years) and is reflected in the biota, including anopheline mosquitoes. Pond H is an extraordinary example of this phenomenon. The variable factors included in the term "weather" have greatest influence, of course, on the temporary and least on the sphagnum and artesian-water types of both classes. Desmid-optimum ponds repeatedly have been observed to become less and less acid during periods of drought. Heavy rains restore approximately the usual acid reaction. It appears reasonably certain that there is in the region succession

from the desmid-poor to the desmid-rich class. A few artesian waters (e. g., pond C) where the area impounded relative to the source is great, seem to be acquiring characteristics of the latter class. Most lentic waters appear to have reached an end type at the desmid-optimum. It is possible, however, that this is no more climax (in the sense of the plant ecologists) than is the domination of much of the southeastern coastal region by pines, which are admittedly subclimax. Perhaps the sphagnum type of pond, particularly as developed in the Okefenokee Swamp, supports climatic plant associations. There is no evidence to indicate succession from the desmid-optimum or other types, but it is reasonable to suppose that this takes place. Possibly upon the ascendency of sphagnum itself depends a shift from desmid-optimum to the sphagnum type.

SUMMARY

A preliminary limnological classification of ponds of the coastal region of Georgia and South Carolina is proposed. Twenty-six representative ponds near Savannah, Ga., are compared from data relating to reaction, source and nature of water, individual variability, permanence, and especially biotas. Hydrophytes are considered and found wanting as index organisms. Reasons are given for regarding the desmids as a suitable group for the discrimination of pond types. A total of 88 identified desmid species, varieties, and forms represent 23 of the 27 genera recently reported from the United States. However, almost as many unidentified, well-marked, recognizable species and one additional genus aid in characterizing the habitats. A desmid-poor class of ponds, in which desmids are qualitatively always, and quantitatively usually, infrequent, is recognized and described. Three types of the class—(1) temporary, desmid-poor, (2) *Closterium*-euglenoid, (3) artesian-water—are distinguished and designated. A second class, desmid-rich, which includes most of the standing fresh water of the region, is similarly divided into three types—(1) temporary, desmid-rich, (2) desmid-optimum, and (3) sphagnum. Variability within the limits of a type is discussed and probable need of subdivision of some types is suggested. A key to the pond classes and types is presented which summarizes their most salient characteristics.

Tentative correlations of *Anopheles* larval occurrence and pond types are presented. Decided differences in suitability of the different types of ponds for the local species of *Anopheles* are manifest. *Anopheles quadrimaculatus* was found to occur in large numbers throughout the warm season only in the temporary, desmid-poor, and the artesian-water types of the desmid-poor class. When present in the desmid-rich class either in ponds of the desmid-optimum or temporary,

desmid-rich types, the species is both restricted and inhibited by as yet undetermined, unfavorable environmental factors. In such waters not only do relatively few imagines emerge during only part of the active breeding season, but also the larvae ordinarily occur in limited areas of the ponds. *Anopheles quadrimaculatus* has not been found to breed in the sphagnum type. *A. walkeri* has been found by us only in a subtype of the temporary, desmid-rich waters. *A. punctipennis*, like *A. quadrimaculatus*, appears to be associated principally with waters of the desmid-poor class but has also a propensity for flowing water. Small streams of the region studied usually drain desmid-rich ponds, a fact which probably explains the relative infrequency of the species in coastal Georgia. *A. crucians* inhabits all six pond types but the species has been observed to thrive best in desmid-rich waters. It is recommended that American malariologists try the proposed key to pond types when making anopheline surveys with a view to perfecting this classification and eventually providing fundamental facts of anopheline ecology.

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FACTORS INFLUENCING CARCINOGENESIS WITH METHYLCHOLANTHRENE [1]

I. THE EFFECT OF AGE

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It is of fundamental significance to determine whether the cells of the younger or of the older individual are more susceptible to malignant degeneration. The influence of age upon the production of tumors with carcinogenic compounds remains unestablished, as the published studies reach diametrically opposite conclusions.

Woglom (*1*), in a comprehensive review, has stated that age is not an important factor in experimental tar cancer. Dunning, Curtis, and Bullock (*2*) have reported that the average time from injection of 3:4 benzpyrene to observation of tumors was slightly longer in young than in old rats and mice. The mean latent periods after a single subcutaneous injection of 8 mg. of benzpyrene in 0.8 cc. paraffin into rats were as follows: In animals up to 60 days old, 147 days; 60 to 120 days old, 156 days; 120 to 180 days old, 133 days; and in rats over 180 days old, 128 days. The mean latent periods after a single injection of 2 mg. of benzpyrene in 0.2 cc. paraffin into mice were: In animals up to 60 days old, 116 days; 60 to 120 days old, 104 days; 120 to 180 days old, 111 days; and in mice over 180 days old, 108 days. The value of the observations is reduced because the authors reached the extraordinary conclusion that "the probability of the occurrence of malignant changes was not influenced by the * * * genetic constitution of the host" and because they apparently used several strains of mice and of rats in the compilation of the results upon the effects of age. Moreover, the large doses of the carcinogen employed may have obscured the findings.

Brunschwig and Tschetter (*3*) injected 12 rats over 1 year of age and 13 rats 3 weeks old with 2 mg. of methylcholanthrene in 0.1 cc. of lard and found no difference in the latent period of tumor production. In the older rats, 9 developed sarcoma between 96 and 192 days (average 151), and in the younger group, 8 developed tumors between 148 and 184 days (average 159) after injection.

In contrast, Strong, Smith, and Gardner (*4*) observed that tumors were produced earlier in younger mice after injections with 3:4:5:6-dibenzcarbazole in sesame oil. In mice of the CBA strain, subcutaneous sarcomas appeared in 97 days in animals averaging 148 days of age, in 116 days in mice 198 days old, and in 148 days in 425-day-old mice. In mice of strain A, tumors arose in 96 days in animals 161 days old, and in 108 days when the mice were 244 days old at the time of injection.

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

The following investigations of the effect of age upon carcinogenesis with methylcholanthrene in mice were begun in August 1938.

EXPERIMENTAL

Experiment 1.—Male mice of the C_3H strain, 1.5, 5, 11, and 17 months of age were injected subcutaneously with 0.8 mg. of methylcholanthrene dissolved in 0.2 cc. of lard. The animals were examined weekly and were killed and necropsied as soon as an indubitable tumor was present.

The results are presented in table 1. Although the absolute differences in the average times at which the tumors arose are not striking, the average latent period was prolonged as the age of the animals increased. Thus, although the difference between the 6-week-old animals and 17-month animals is only 2.5 weeks, the relationship $1.5 < 5 < 11 < 17$ is significant. Moreover, whereas the first tumors in mice 5 months old or younger appeared in 7 weeks, no tumors occurred before 9 weeks in 17-month-old mice.

TABLE 1.—*Experiments 1 and 4. Time of appearance of subcutaneous tumors in C_3H mice 1.5, 5, 11, and 17 months old following injection of methylcholanthrene*

Experiment No.	Mice	Age in months	Average weight, gm.	Methylcholanthrene, mg.	Number injected	Time in weeks: 7	8	9	10	11	12	13	14	15	16	17	Total number of tumors	Average time in weeks
						Number of tumors												
1	C_3H ♂	1.5	17	0.8	19	2	10	5	2	----	----	----	----	----	----	----	19	8.3
1	do	5	85	.8	11	1	2	4	1	2	1	----	----	----	----	----	11	9.4
1	do	11	38	.8	21	----	6	4	2	2	4	1	1	----	----	----	20	10.0
1	do	17	38	.8	16	----	----	3	4	3	1	3	----	----	----	----	14	10.8
4	do	1.5	17	.4	22	1	2	8	2	2	4	2	2	----	----	2	20	11.4

The experiment was terminated at 22 weeks, when one mouse injected at 11 months and one mouse injected at 17 months of age were still living and well.

Experiment 2.—Male mice of the I strain, 1.5 and 5 months of age, were injected subcutaneously in the right axilla with 1.0 mg. of methylcholanthrene in 0.25 cc. of lard.

As seen in table 2, the difference between the two age groups is more striking when mice less susceptible to carcinogenic hydrocarbons than the C_3H strain were utilized. At 17 weeks after injection, half of the younger animals had developed tumors, whereas not one of the older mice had done so; at 24 weeks, all of the younger animals and less than half of the older animals had sarcoma. The experiment was terminated at 30 weeks, when 5 of the older mice were still living and well.

TABLE 2.—*Experiment 2. Time of appearance of subcutaneous tumors in I mice 1.5 and 5 months old following injection of 1.0 mg. methylcholanthrene in 0.25 cc. lard*

Time in weeks				12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total number of tumors	Average time in weeks
Mice	Age in months	Average weight, gm.	Number injected	Number of tumors																		
I ♂	1.5	16	10	1	1	--	2	1	--	1	2	--	--	--	1	1	--	--	--	--	10	17.4
I ♂	5	25	11	--	--	--	--	--	--	1	1	--	1	--	1	--	--	1	--	1	6	22.5+

Experiment 3.—Male mice of the L strain (or M leaden strain), 2 months old (10 animals, weighing an average of 20 grams), and 11 months old (10 animals, weighing an average of 33 grams), were injected subcutaneously with 0.8 mg. of methylcholanthrene in 0.2 cc. of lard.

Five animals of the younger group developed tumors, at 9, 11, 12, 14, and 15 weeks, before the first tumor, at 16 weeks, arose in the older animals. The experiment was terminated at this time because the condition of the older mice was becoming unsatisfactory.

Experiment 4.—It is to be noted that in the three experiments described above, there was a marked disparity in the weight of the younger and the older animals. It was impossible to obtain mice of the same age with significant differences in weight, for in pure-strain mice kept under identical conditions and upon identical diets, the weights at any one age are approximately the same. Therefore, 22 male C_3H mice 6 weeks old were injected subcutaneously with 0.4 mg. methylcholanthrene in 0.2 cc. of lard. Since their weight was about half the weight of the animals 5 months or older, the dose was proportional to the weight of these animals. As shown in table 1, tumors arose in 20 out of 22 animals in the average time of 11.4 weeks. Although the average latent period was longer than in any of the other groups, regardless of age, it is suggestive that 3 of these young mice developed tumors before the first tumor was noted in the 17-month-old animals, despite the great difference in the amounts of the hydrocarbon administered.

DISCUSSION

In mice of strains C_3H, I, and L, injected with 0.8 to 1.0 mg. methylcholanthrene in lard, tumors developed earlier in 39 animals 2 months of age or younger than in 58 animals that were 5 to 17 months old at the time of injection.

Since the action of methylcholanthrene in the animal body is still unelucidated, the results may be interpreted in two ways. First, if the production of neoplasm by methylcholanthrene is a local tissue reaction, as is concluded for benzpyrene by Brock, Druckrey, and Hamperl (*5*), it may be stated that the younger tissues are more sus-

ceptible than the older tissues to malignant degeneration with the agent. Second, if methylcholanthrene acts upon the whole body, the results are explainable by the variance in the weight-dose ratio. The studies on the excretion of hydrocarbons (*6*) support the view that the whole body is involved in at least the elimination of the compounds, if not in the actual local neoplasia. It is therefore evident that it cannot be unreservedly concluded that the subcutaneous tissue of the younger and rapidly growing mice is more prone to sarcomatous degeneration with methylcholanthrene than is the subcutaneous tissue of the fully developed or the senescent animals.

Whether dependent upon the age or upon the relative size of the mice, the investigation illustrates that in experiments designed to compare various factors that may influence carcinogenesis with carcinogenic hydrocarbons, the age and the weight of the animals, as well as the strain (*7*), and possibly the sex must be taken into consideration.

CONCLUSIONS

1. In mice of strains C_3H, I, and L, injected subcutaneously with 0.8 to 1.0 mg. methylcholanthrene in lard, tumors developed earlier in 39 animals 2 months of age or younger than in 58 animals 5 to 17 months old.

2. The age and/or the weight of pure strain mice modifies the latent period of carcinogenesis with methylcholanthrene.

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THE PREPARATION AND CLEANING OF THE NIH ANAL SWAB USED IN THE DIAGNOSIS OF OXYURIASIS

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The NIH anal swab, first described by Hall (*1*), has been used extensively in connection with a group study on oxyuriasis conducted by the Division of Zoology of the National Institute of Health. Because of an increasing interest in this method of diagnosis, additional information concerning the swab is frequently requested by public health investigators and by private physicians. A description will be given here of the procedure which, after considerable experimentation, has been adopted for the preparation of the swabs and for their cleaning after use.

SPECIFICATIONS FOR THE NIH SWAB

The NIH swab (fig. 1) consists of the swab proper and the tube housing it. The swab proper is composed of a solid glass rod approximately 4 mm. in diameter and 4 inches long, with rounded ends. The rod is inserted through a No. 00 single-hole rubber stopper with about 1 inch of the rod protruding from the larger end of the stopper, to form a handle. At the other end of the rod, a cellophane tip is held securely by a rubber band made from rubber tubing having a 3-mm. bore and walls 2 mm. in thickness cut into strips approximately 2 mm. wide. The tips consist of 25-mm. squares of plain, transparent (P. T.) cellophane which may be procured in rolls 25 mm. in width.

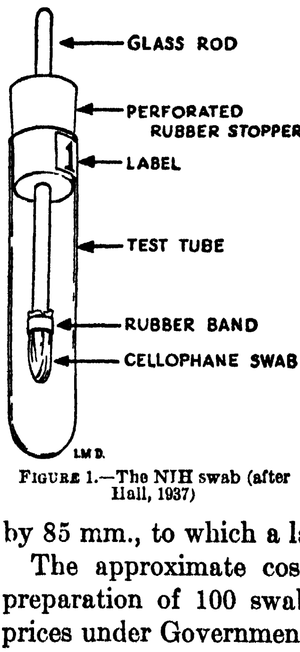

FIGURE 1.—The NIH swab (after Hall, 1937)

The swab proper fits into a test tube 15 by 85 mm., to which a label of adhesive tape is attached.

The approximate cost of the material necessary for the initial preparation of 100 swabs is slightly over $3, according to present prices under Government order; this cost is apportioned as follows:

100 test tubes (85 by 15 mm.)	$1.60
100 glass rods (4 mm. diameter by 4 inches long)	.73
100 rubber bands (2 mm. walls, 3 mm. bore)	.04
100 No. 00 one-hole rubber stoppers	.85
100 strips of adhesive tape (1 inch wide)	.07
100 squares of 1-inch cellophane	.01
	3.30

DISPENSER FOR CELLOPHANE RIBBON

In order to facilitate preparation of the swabs, a dust-proof wooden housing, made of white pine, has been devised for the cellophane roll (figs. 2 and 3). The front is detachable and is held in position by two hooks, one at the top (fig. 2B) and one at the bottom of the box. On the ⅜-inch bolt (fig. 2C) 3 inches long, revolves a wooden spool (fig. 3A) carrying the cellophane reel (fig. 3B). The ribbon of cellophane (fig. 2D) passes through an aperture in the front of the box; a metal strip (fig. 3C) on the inner surface guides the ribbon and feeds it between two rubber rollers (fig. 3D) operated by a crank (fig. 3E). The crank is turned until the cellophane strip extends to a ridge (fig. 2E) placed seven-eighths of an inch below the rollers (fig. 2F), and the desired length of the ribbon is cut off by forcing the strip up against a razor blade (fig. 2G) held in position between two metal strips (fig. 2H) mounted with two small screws.

USE OF NIH SWAB IN DIAGNOSIS OF OXYURIASIS

For the diagnosis of pinworm infection, the cellophane-covered tip of the swab is stroked firmly, with an outward motion, over the perianal folds and across the anal opening, preferably in the morning immediately after the patient arises, in order to pick up pinworm ova which may have been deposited during the night by migrating females. For microscopical examination, the cellophane square is mounted in water or, if fecal material is apparent, in decinormal sodium hydroxide, and the surface of the cellophane and material released from it are examined for ova. The remaining parts of the swab may be cleaned and sterilized as described below, for subsequent reuse.

METHOD OF CLEANING THE NIH SWAB

As received in the laboratory, all swabs used for the diagnosis of oxyuriasis must be regarded as carrying infective material. The object of the method here described is the handling of the various parts of the swab in such a manner that (1) until after sterilization the hands will not come in contact with any part of the swab proper other than the handle, and (2) there will be thorough cleaning of all parts of both the swab proper and the housing. There must be no ova remaining from a previous use of the swab, since such ova might be carried over to a later examination and thus be credited to the wrong patient, possibly leading to a faulty diagnosis.

A 10-percent solution of trisodium phosphate has been found to distort the outer layers of the shell of the pinworm ovum, thus distinguishing it from nontreated ova. The use of this solution also loosens the ova and debris from the glass rod and the sides of the

tube. In addition, this process will loosen the rubber stopper from the glass rod and enable that part of the swab under the stopper to be cleaned.

Two containers of approximately 3-liter capacity each are used, one to receive the swabs and the other the tubes. These parts are im-

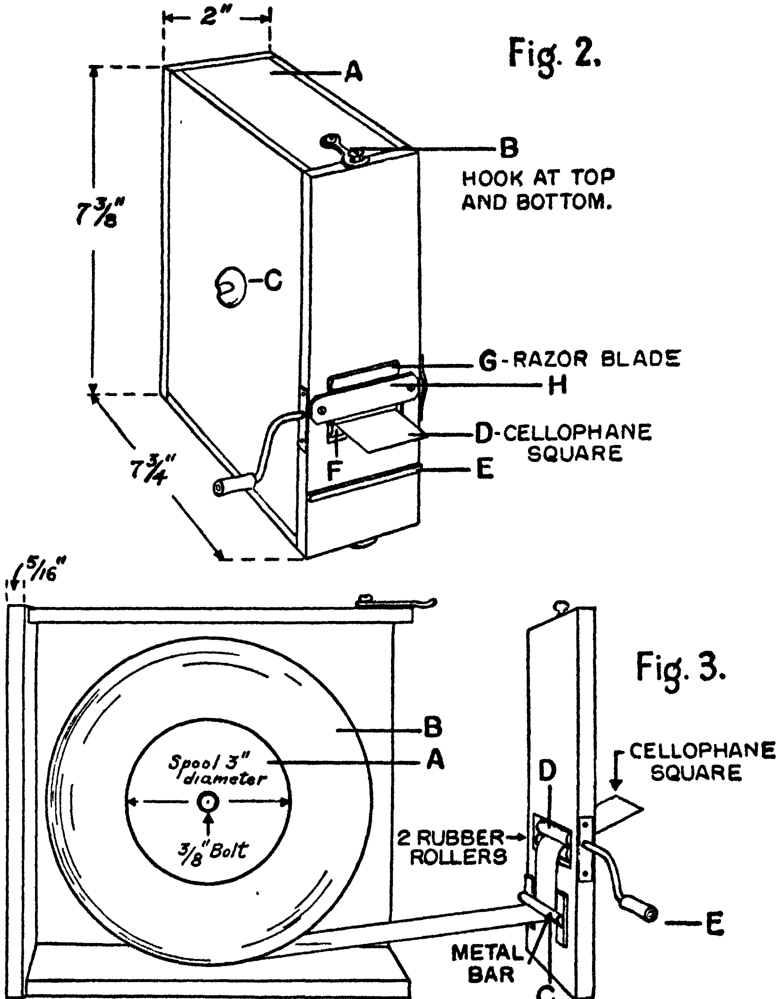

FIGURE 2.—Three-quarter view of NIH cellophane ribbon dispenser.

FIGURE 3.—Side view of NIH cellophane ribbon dispenser.

mersed in the trisodium phosphate solution for 24 to 48 hours; they are then handled separately, as follows.

The swab proper.—The trisodium phosphate solution is poured off and the swabs are transferred to a flat-bottomed tray and autoclaved for 15 minutes at 15 pounds' pressure.

After cooling, the rubber band which had been used for holding the cellophane tip in position is removed with forceps. The swabs are then put under running water for 20 minutes.

The rod and stopper of each swab are dried with a clean piece of gauze, examined for defects, and stored for future use.

The tube or housing of the swab.—The tubes are handled in much the same manner as described for the swabs. After having been soaked in the trisodium phosphate solution, the adhesive tape label is easily removed from the tubes. The tubes are then transferred to a metal tray and autoclaved for 15 minutes at 15 pounds' pressure.

After sterilization, the tubes are washed in liquid soap and water with a stiff brush and rinsed in running water several times. They are then inverted in a wire basket and the excess water allowed to drain off.

Owing to the strong alkali action of trisodium phosphate on glass, the tubes may become quite cloudy with continued use. The cloudiness may be removed by immersion of the tubes in a 20-percent solution of oxalic acid until the glass is clear. After drying, the tubes are placed in an oven at 150° C. for 1 hour. When cooled, they are stored for future use.

This method of preparing and cleaning the NIH swab has been in use in the Division of Zoology for the past 2 years. It has proved to be both speedy and economical.

REFERENCE

(*1*) Hall, M. C.: Studies on oxyuriasis. I. Types of anal swabs and scrapers, with a description of an improved type of swab. Am. J. Trop. Med., **17**: 445–453 (1937).

DEATHS DURING WEEK ENDED JULY 8, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 8, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,206	7,245
Average for 3 prior years	[1] 7,857	
Total deaths, first 27 weeks of year	236,564	229,223
Deaths under 1 year of age	454	543
Average for 3 prior years	[1] 545	
Deaths under 1 year of age, first 27 weeks of year	14,025	14,354
Data from industrial insurance companies:		
Policies in force	67,112,141	69,193,356
Number of death claims	8,512	8,915
Death claims per 1,000 policies in force, annual rate	6.6	6.7
Death claims per 1,000 policies, first 27 weeks of year, annual rate	10.9	9.6

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (.....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934–38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934–38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	2	1	.....	.....	.....	.....	302	50	39	80
New Hampshire	10	1	0	0	.....	.....	.....	.....	71	7	.....	3
Vermont	13	1	0	0	.....	.....	.....	.....	1,019	76	48	29
Massachusetts	4	3	4	9	.....	.....	.....	.....	482	410	157	217
Rhode Island	8	1	0	1	.....	.....	.....	.....	397	52	2	16
Connecticut	0	0	3	3	6	2	2	1	321	108	38	53
MID. ATL.												
New York	8	21	26	29	[1] 4	[1] 6	[1] 3	[1] 3	330	840	1,092	1,066
New Jersey [3]	8	7	8	8	.....	.....	4	2	24	20	98	247
Pennsylvania	11	22	15	17	.....	.....	.....	.....	34	66	549	514
E. NO. CEN.												
Ohio	5	6	22	13	10	13	.....	7	59	77	233	604
Indiana	15	10	13	7	18	12	19	8	9	6	10	27
Illinois [2]	11	17	22	26	7	10	6	7	15	23	91	299
Michigan [3]	6	6	14	14	.....	.....	.....	.....	104	98	482	137
Wisconsin	2	1	3	3	25	14	21	4	334	190	659	569
W. NO. CEN.												
Minnesota	2	1	11	4	2	1	3	1	56	29	122	53
Iowa [2]	8	4	2	4	2	1	.....	.....	111	55	57	15
Missouri	4	3	9	12	.....	.....	.....	27	4	3	15	35
North Dakota	15	2	1	1	467	64	16	2	285	30	42	8
South Dakota	8	1	2	2	.....	.....	.....	.....	113	15	.....	3
Nebraska	15	4	1	2	.....	.....	.....	.....	31	8	22	22
Kansas	0	0	3	6	.....	.....	2	2	28	10	21	21

Cases of certain diseases reported by telegraph by State health officers for the week ended July 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria July 15, 1939, rate	Diphtheria July 15, 1939, cases	Diphtheria July 16, 1938, cases	Diphtheria 1934–38, median	Influenza July 15, 1939, rate	Influenza July 15, 1939, cases	Influenza July 16, 1938, cases	Influenza 1934–38, median	Measles July 15, 1939, rate	Measles July 15, 1939, cases	Measles July 16, 1938, cases	Measles 1934–38, median
SO. ATL.												
Delaware	0	0	1	1	----	----	----	----	20	1	3	3
Maryland [1,3]	6	2	2	4	15	5	2	1	83	27	21	31
Dist. of Col	40	5	6	6	8	1	----	----	283	35	10	10
Virginia [3]	21	11	11	7	36	19	----	----	171	91	65	60
West Virginia	8	3	3	9	30	11	7	7	5	2	41	41
North Carolina [3,4]	10	7	10	10	1	1	2	1	120	82	301	86
South Carolina	16	6	3	2	229	84	69	40	22	8	33	8
Georgia [4]	17	10	16	5	43	26	----	----	25	15	----	----
Florida [4]	6	2	6	3	21	7	----	----	33	11	13	8
E. SO. CEN.												
Kentucky	7	4	2	5	----	----	3	3	3	2	15	40
Tennessee [4]	5	3	5	3	23	13	15	5	39	22	19	19
Alabama [4]	18	10	9	10	16	9	7	7	14	8	23	10
Mississippi [3]	8	3	3	4	----	----	----	----	----	----	----	----
W. SO. CEN.												
Arkansas	12	5	5	5	15	6	5	4	57	23	30	4
Louisiana [4]	10	4	12	9	75	31	11	11	----	[5] 366	6	9
Oklahoma	2	1	4	3	6	3	42	7	40	20	21	8
Texas [4]	99	119	20	20	72	87	91	55	70	85	47	76
MOUNTAIN												
Montana [3]	0	0	1	1	----	----	----	----	271	29	38	13
Idaho [3]	0	0	4	0	----	----	1	1	20	2	5	5
Wyoming	0	0	0	0	----	----	----	----	458	21	1	2
Colorado [6]	24	5	9	3	----	----	----	----	77	16	30	30
New Mexico	0	0	0	0	----	----	----	----	49	4	8	8
Arizona	0	0	2	1	123	10	18	8	49	4	17	7
Utah [1,3]	10	1	5	0	----	----	1	----	238	24	107	22
PACIFIC												
Washington	0	0	0	0	----	----	----	----	1,135	368	21	45
Oregon	5	1	1	1	30	6	21	4	303	61	18	17
California	17	21	16	20	14	17	16	16	393	479	397	323
Total	13	335	317	317	22	459	387	232	146	3,622	5,067	5,067
28 weeks	15	10,759	12,796	13,685	253	150,230	44,403	102,780	494	342,249	751,050	656,834

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934-38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934-38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	338	56	10	10
New Hampshire	0	0	0	0	0	0	0	0	0	0	1	3
Vermont	0	0	0	0	0	0	1	1	13	1	4	4
Massachusetts	1.2	1	1	1	1.2	1	1	2	60	51	98	66
Rhode Island	0	0	0	0	0	0	1	1	0	0	6	6
Connecticut	0	0	0	0	0	0	0	0	39	13	19	12
MID. ATL.												
New York	0	0	2	10	2.4	6	2	9	41	103	140	167
New Jersey [2]	0	0	0	1	2.4	2	2	2	37	31	17	31
Pennsylvania	2	4	2	2	0	0	0	0	50	98	188	144
E. NO. CEN.												
Ohio	1.5	2	1	4	4	5	1	1	70	91	78	120
Indiana	6	4	0	0	1.5	1	1	0	27	18	23	26
Illinois [2]	0	0	2	4	3	5	2	5	45	69	87	139
Michigan [3]	0	0	1	1	5	5	3	2	90	85	145	137
Wisconsin	0	0	0	0	4	2	0	0	74	42	55	66
W. NO. CEN.												
Minnesota	0	0	0	0	12	6	1	1	25	13	34	34
Iowa [3]	0	0	0	0	0	0	0	0	26	13	23	19
Missouri	0	0	1	2	1.3	1	1	1	10	8	18	19
North Dakota	0	0	2	1	15	2	0	0	15	2	12	10
South Dakota	0	0	0	0	0	0	2	0	30	4	6	2
Nebraska	0	0	1	0	4	1	0	0	19	5	4	4
Kansas	0	0	0	1	0	0	0	2	64	23	16	27
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	39	2	2	2
Maryland [2] [3]	0	0	1	3	0	0	0	0	49	16	9	16
Dist. of Col.	0	0	0	0	0	0	1	0	8	1	3	3
Virginia [3]	6	3	4	4	1.9	1	4	3	26	14	8	8
West Virginia	0	0	1	1	0	0	0	2	24	9	12	17
North Carolina [2] [4]	2.9	2	3	3	4	3	1	3	13	9	23	17
South Carolina	5	2	1	1	55	20	1	1	3	1	1	2
Georgia [4]	0	0	1	1	8	5	1	1	2	1	8	5
Florida [4]	3	1	1	0	9	3	1	0	15	5	2	1
E. SO. CEN.												
Kentucky	5	3	2	1	5	3	1	1	7	4	9	11
Tennessee [4]	0	0	1	2	4	2	2	7	26	15	4	4
Alabama [4]	0	0	4	0	4	2	3	3	18	10	9	9
Mississippi	0	0	1	1	0	0	3	2	5	2	6	3
W. SO. CEN.												
Arkansas	5	2	0	1	2.5	1	0	0	2	1	6	6
Louisiana [4]	2.4	1	3	1	2.4	1	1	1	17	7	3	6
Oklahoma	0	0	0	0	2	1	1	0	10	5	12	7
Texas [4]	0	0	0	2	12	15	1	1	14	17	35	30
MOUNTAIN												
Montana [2]	9	1	0	0	0	0	0	0	75	8	10	4
Idaho [2]	0	0	1	0	0	0	0	0	20	2	6	3
Wyoming	0	0	0	0	0	0	0	0	153	7	0	1
Colorado [6]	0	0	0	0	5	1	0	0	43	9	24	21
New Mexico	0	0	0	0	12	1	1	0	49	4	5	5
Arizona	0	0	0	0	12	1	1	0	12	1	2	4
Utah [2] [3]	0	0	0	0	10	1	0	0	40	4	9	9
PACIFIC												
Washington	0	0	0	0	0	0	0	0	15	5	15	14
Oregon	0	0	0	0	0	0	0	0	25	5	10	11
California	0.8	1	0	3	37	45	4	19	54	60	81	81
Total	1.1	27	37	79	6	143	45	191	38	956	1,298	1,391
28 weeks	1.8	1,232	1,963	3,795	1.4	1,020	625	1,346	160	112,675	132,945	160,214

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934–38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases	1934–38, median	July 15, 1939, rate	July 15, 1939, cases	July 16, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	1	1	157	26	16
New Hampshire	0	0	0	0	10	1	0	0	0	0	0
Vermont	0	0	0	0	80	6	0	0	630	47	36
Massachusetts	0	0	0	0	5	4	0	3	165	140	94
Rhode Island	0	0	0	0	0	0	0	0	237	81	14
Connecticut	0	0	0	0	9	3	4	1	157	53	64
MID. ATL.											
New York	0	0	0	0	5	13	14	14	165	413	603
New Jersey [2]	0	0	0	0	7	6	1	6	285	239	318
Pennsylvania	0	0	0	0	3	6	15	15	222	438	334
E. NO. CEN.											
Ohio	9	12	0	0	7	9	8	12	403	524	302
Indiana	3	2	25	2	12	8	16	9	146	98	15
Illinois [2]	2	3	13	11	16	25	17	23	237	362	415
Michigan [3]	1	1	4	0	1	1	0	3	191	181	448
Wisconsin	0	0	0	5	0	0	3	2	373	212	245
W. NO. CEN.											
Minnesota	4	2	7	6	0	0	1	1	68	35	66
Iowa [2]	26	13	6	5	4	2	2	2	69	34	27
Missouri	4	3	8	5	6	5	7	21	46	36	40
North Dakota	15	2	4	1	0	0	1	0	421	58	51
South Dakota	53	7	0	1	0	0	0	0	23	3	10
Nebraska	11	3	3	3	0	0	1	1	130	34	20
Kansas	3	1	1	3	3	0	7	6	61	22	119
SO. ATL.											
Delaware	0	0	0	0	20	1	1	1	138	7	6
Maryland [2] [3]	0	0	0	0	6	2	12	12	200	65	49
Dist. of Col.	0	0	0	0	32	4	3	1	307	38	12
Virginia [2]	0	0	0	0	69	37	26	17	109	58	88
West Virginia	0	0	0	0	46	17	4	9	22	8	71
North Carolina [2] [4]	3	2	0	0	28	19	21	25	400	274	340
South Carolina	0	0	0	0	57	21	11	22	49	18	101
Georgia [4]	0	0	0	0	40	24	50	50	55	34	26
Florida [4]	0	0	0	0	3	1	1	1	99	33	0
E. SO. CEN.											
Kentucky	0	0	6	0	64	37	38	38	76	44	52
Tennessee [4]	0	0	0	0	56	32	45	45	229	130	62
Alabama [4]	0	0	0	0	23	13	20	24	37	21	34
Mississippi [3]	0	0	0	0	23	9	11	16	------	------	------
W. SO. CEN.											
Arkansas	2	1	0	0	32	13	28	23	37	15	18
Louisiana [4]	0	0	0	0	97	40	21	21	385	159	68
Oklahoma	0	0	5	1	40	20	26	26	8	4	49
Texas [4]	0	0	5	0	25	30	55	40	95	115	268
MOUNTAIN											
Montana [2] [7]	0	0	1	1	9	1	2	2	56	6	55
Idaho [2]	0	0	6	2	20	2	3	0	0	0	2
Wyoming	44	2	0	3	0	0	0	0	22	1	5
Colorado [6]	10	2	4	3	24	5	7	2	183	38	50
New Mexico	0	0	0	0	74	6	3	5	235	19	18
Arizona	25	2	2	0	25	2	6	4	0	0	18
Utah [2] [3]	0	0	0	0	10	1	3	0	755	76	74
PACIFIC											
Washington	3	1	18	4	6	2	5	5	52	17	62
Oregon	5	1	8	3	10	2	3	3	99	20	35
California	11	14	14	3	6	7	17	11	89	109	249
Total	3	74	140	103	17	437	520	594	174	4,295	5,049
28 weeks	12	[7] 8,454	12,270	5,788	7	4,601	5,268	5,268	158	100,344	121,044

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 15, 1939, 22 cases as follows: New Jersey, 3; Illinois, 3; Iowa, 3; Maryland, 1; Virginia, 4; North Carolina, 5; Montana, 1; Idaho, 1; Utah, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 15, 1939, 77 cases as follows: North Carolina, 6; Georgia, 27; Florida, 5; Tennessee, 5; Alabama, 17; Louisiana, 2, Texas, 15.
[5] Delayed report.
[6] Colorado tick fever, Colorado, 2 cases.
[7] One case reported as Rocky Mountain spotted fever in Montana during the week ended July 1, published in the PUBLIC HEALTH REPORTS of July 14, 1939, p. 1293, was later diagnosed as smallpox.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to July 22, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	Week ended July 22
New York				3	3	
New Jersey				4	8	1
Pennsylvania				6	3	1
Ohio				3	2	
Indiana				2	1	
Illinois			1	1	5	2
Iowa			1	10	9	2
Missouri				1		
Delaware				3		
Maryland			7	13	11	5
District of Columbia			2	2	2	1
Virginia			1	13	10	1
North Carolina				3	13	5
Georgia					1	
Tennessee			1		3	3
Montana	[1] 2	2	8	5	1	
Idaho		4	7	4	5	
Wyoming		3	14	16	5	3
Colorado		2	3	9	4	
Utah		2	5	5	6	2
Washington		2	8	2		
Oregon		9	16	7	2	

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
June 1939										
Delaware	1	0			43		0	13	0	2
Iowa	2	18	9	1	511		0	144	54	12
Kentucky	2	15	23	16	48	8	1	55	3	52
Maine	0	4	1		568		0	37	0	3
Nebraska	1	4	10		454		2	31	21	2
New Jersey	2	42	9		117		1	353	0	6
Ohio	3	48	61	1	243	1	0	642	58	26
Pennsylvania	36	72		3	611	2	3	716	1	29
Texas	3	74	371	451	1,340	134	11	90	13	70
Vermont	0	0			430		0	17	0	1
West Virginia	1	18	28	1	46	9	0	66	1	35

June 1939

	Cases
Anthrax:	
Pennsylvania	2
Chickenpox:	
Delaware	6
Iowa	139
Kentucky	49
Maine	71
Nebraska	24
New Jersey	627
Ohio	1,015
Pennsylvania	2,015
Texas	343
Vermont	65
West Virginia	40
Diarrhea:	
Ohio (under 2 years; enteritis included)	73
Dysentery:	
Iowa (bacillary)	2
Kentucky	59
New Jersey (amoebic)	1
Ohio (amoebic)	1
Ohio (bacillary)	19
Pennsylvania (amoebic)	4
Texas (amoebic)	4
Texas (bacillary)	295
West Virginia (bacillary)	9
Encephalitis, epidemic or lethargic:	
New Jersey	3
Ohio	2
Pennsylvania	2
German measles:	
Maine	6
New Jersey	38
Ohio	14
Pennsylvania	46
Vermont	6
Impetigo contagiosa:	
Ohio	30

June 1939—Continued

	Cases
Lead poisoning:	
Ohio	10
Leprosy:	
Ohio	1
Texas	1
Mumps:	
Delaware	14
Iowa	111
Kentucky	79
Maine	58
Nebraska	22
New Jersey	505
Ohio	1,421
Pennsylvania	1,109
Texas	125
Vermont	128
West Virginia	56
Ophthalmia neonatorum:	
New Jersey	12
Pennsylvania	4
Texas	2
Puerperal septicemia:	
Ohio	2
Rabies in animals:	
Iowa	5
New Jersey	63
Texas	5
Rabies in man:	
Ohio	2
Rocky Mountain spotted fever:	
Delaware	3
Iowa	11
New Jersey	7
Ohio	5
Pennsylvania	9
West Virginia	2
Septic sore throat:	
Iowa	5
Kentucky	13
Nebraska	3
New Jersey	25
Ohio	117

June 1939—Continued

	Cases
Tetanus:	
New Jersey	2
Trachoma:	
Maine	1
Pennsylvania	1
Trichinosis:	
New Jersey	1
Pennsylvania	1
Tularaemia:	
Kentucky	2
Texas	15
Typhus fever:	
Maine	1
Pennsylvania	1
Texas	86
Undulant fever:	
Delaware	1
Iowa	38
Kentucky	3
Maine	2
New Jersey	5
Ohio	6
Pennsylvania	9
Texas	17
Vermont	3
West Virginia	1
Vincent's infection:	
Maine	2
Whooping cough:	
Delaware	45
Iowa	131
Kentucky	97
Maine	211
Nebraska	97
New Jersey	1,207
Ohio	867
Pennsylvania	1,639
Texas	584
Vermont	152
West Virginia	76

CASES OF VENEREAL DISEASES REPORTED FOR MAY 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,332	4.60	220	.76
Arizona	235	5.70	120	2.91
Arkansas	814	3.97	222	1.08
California	2,334	3.79	1,455	2.36
Colorado	107	1.00	53	.49
Connecticut	150	.86	65	.37
Delaware	179	6.86	35	1.34
District of Columbia	502	8.01	300	4.78
Florida	1,472	8.81	148	.89
Georgia	1,852	6.00	310	1.00
Idaho	30	.61	12	.24
Illinois	2,618	3.32	1,285	1.63
Indiana	806	2.32	82	.24
Iowa	237	.93	128	.50
Kansas	219	1.17	100	.54
Kentucky	956	3.27	342	1.17
Louisiana	907	4.25	102	.48
Maine	38	.44	32	.37
Maryland	987	5.88	265	1.58
Massachusetts	462	1.04	358	.81
Michigan	1,276	2.64	520	1.08
Minnesota	244	.92	126	.48
Mississippi	2,510	12.41	2,577	12.74
Missouri	1,585	3.97	181	.45
Montana	42	.78	13	.24
Nebraska	67	.49	31	.23
Nevada [1]				
New Hampshire [1]				
New Jersey	767	1.77	195	.45
New Mexico	119	2.82	30	.71
New York	5,233	4.04	2,017	1.56
North Carolina	2,361	6.76	348	1.00
North Dakota	35	.50	38	.54
Ohio	1,636	2.43	285	.42
Oklahoma	1,274	5.00	277	1.09
Oregon	159	1.55	92	.90
Pennsylvania	1,345	1.32	195	.19
Rhode Island	98	1.44	42	.62
South Carolina	1,317	7.02	337	1.80
South Dakota	13	.19	17	.25
Tennessee	927	3.20	338	1.17
Texas	5,708	9.25	843	1.37
Utah	12	.23	25	.48
Vermont	10	.26	15	.39
Virginia	1,740	6.43	298	1.10
Washington	249	1.50	176	1.06
West Virginia	306	1.64	114	.61
Wisconsin	93	.32	109	.37
Wyoming			4	.17
Hawaii	78	1.93	83	2.05
Total	45,441	3.52	14,900	1.16

See footnotes at end of table.

Reports from cities of 200,000 population or over [2]

Atlanta, Ga	266	8.86	47	1.57
Baltimore, Md	582	6.97	189	2.26
Birmingham, Ala	318	10.80	70	2.68
Boston, Mass	200	2.51	129	1.62
Buffalo, N. Y	100	1.66	49	.81
Chicago, Ill	1,706	4.65	890	2.43
Cincinnati, Ohio	212	4.49	98	2.07
Cleveland, Ohio	269	2.85	101	1.07
Columbus, Ohio	61	1.95	12	.38
Dallas, Tex	222	7.30	108	3.55
Denver, Colo	67	2.22	43	1.43
Detroit, Mich	545	3.00	266	1.47
Houston, Tex	317	8.85	110	3.07
Indianapolis, Ind	25	.65	22	.57
Jersey City, N. J	23	.71	11	.34
Louisville, Ky	253	7.46	56	1.65
Memphis, Tenn	249	8.53	111	3.80
Minneapolis, Minn	75	1.50	23	.46
Newark, N. J	311	6.85	106	2.33
New York, N. Y	3,996	5.33	1,598	2.13
Omaha, Nebr	35	1.57	8	.36
Philadelphia, Pa	488	2.43	----------	----------
Pittsburgh, Pa	362	5.14	18	.26
Portland, Oreg	90	2.81	51	1.59
Rochester, N. Y	32	.94	37	1.08
St. Paul, Minn	34	1.18	9	.31
San Antonio, Tex	150	5.73	81	3.10
San Francisco, Calif	166	2.41	164	2.38
Seattle, Wash	109	2.82	82	2.12
Syracuse, N. Y	120	5.32	21	.93
Washington, D. C	502	8.01	300	4.78

[1] No report for current month.
[2] Reports not received from Akron, Dayton, Kansas City, Mo., Los Angeles, Milwaukee, New Orleans, Oakland, Providence, St. Louis, or Toledo.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 8, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	118	32	14	2,012	339	636	8	374	58	1,334	--------
Current week [1]	64	13	12	998	210	296	0	327	21	1,113	--------
Maine:											
Portland	0	------	0	3	2	0	0	0	0	1	27
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	8
Manchester	0	------	0	0	0	0	0	0	0	0	6
Nashua	0	------	0	0	0	0	0	0	1	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	6	2
Burlington	0	------	0	4	0	0	0	0	0	0	16
Rutland	0	------	0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	2	------	0	80	10	7	0	4	0	27	187
Fall River	1	------	0	1	0	1	0	2	0	0	24
Springfield	0	------	0	12	0	1	0	0	0	0	31
Worcester	0	------	0	11	6	1	0	0	0	12	45
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	10
Providence	0	------	0	51	3	6	0	3	0	12	51
Connecticut:											
Bridgeport	------	------	------	------	------	------	------	------	------	------	------
Hartford	0	------	0	1	0	0	0	1	0	7	30
New Haven	0	1	0	39	0	0	0	0	0	4	29
New York:											
Buffalo	0	------	0	24	3	8	0	5	0	12	112
New York	9	1	1	106	35	44	0	67	1	120	1,205
Rochester	0	1	0	27	3	2	0	2	0	5	61
Syracuse	0	------	0	113	1	1	0	2	0	84	56

[1] Figures for Bridgeport and Winston-Salem estimated; reports not received.

City reports for week ended July 8, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	0	------	0	1	0	5	0	0	0	7	15
Newark	1	------	0	7	1	6	0	5	0	51	83
Trenton	0	------	0	0	1	1	0	4	0	7	27
Pennsylvania:											
Philadelphia	1	------	0	23	11	11	0	20	3	113	391
Pittsburgh	1	------	0	0	6	23	0	7	0	25	137
Reading	0	------	0	8	0	0	0	0	0	2	21
Scranton	0	------	------	0	------	4	0	------	0	0	------
Ohio:											
Cincinnati	0	------	0	0	8	5	0	3	0	12	106
Cleveland	0	1	0	4	5	10	0	15	1	80	174
Columbus	1	------	0	4	2	0	0	2	0	6	63
Toledo	0	------	0	19	2	4	6	6	0	47	60
Indiana:											
Anderson	0	------	0	0	0	0	0	2	1	0	12
Fort Wayne	0	------	0	0	0	0	0	0	0	0	26
Indianapolis	2	------	0	2	5	4	0	3	1	47	102
Muncie	0	------	0	0	0	0	0	0	0	0	9
South Bend	0	------	0	0	0	0	0	0	0	6	15
Terre Haute	0	------	1	0	0	0	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	8
Chicago	9	------	1	12	15	41	0	38	0	112	629
Elgin	0	------	0	0	1	0	0	0	0	5	10
Moline	0	------	0	0	0	0	0	0	0	2	10
Springfield	0	------	0	1	1	1	0	0	0	13	31
Michigan:											
Detroit	2	------	1	39	5	31	0	13	0	57	207
Flint	0	------	0	0	1	2	0	0	0	7	13
Grand Rapids	0	------	0	2	0	9	0	0	0	2	27
Wisconsin:											
Kenosha	0	------	0	0	1	0	0	1	0	1	7
Madison	0	------	0	34	2	0	0	0	0	10	15
Milwaukee	0	------	0	2	0	15	0	2	0	25	101
Racine	1	------	0	1	0	0	0	0	0	2	13
Superior	0	------	0	7	0	0	0	0	0	0	9
Minnesota:											
Duluth	0	------	0	3	1	0	0	1	0	0	17
Minneapolis	0	------	0	2	2	5	0	4	0	2	84
St. Paul	0	------	0	3	4	3	0	2	0	15	60
Iowa:											
Cedar Rapids	0	------	------	7	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	1	2	------	0	0	------
Des Moines	1	------	0	3	0	0	1	0	2	0	43
Sioux City	0	------	------	3	------	0	0	------	0	4	------
Waterloo	4	------	------	0	------	2	0	------	0	5	------
Missouri:											
Kansas City	0	------	0	1	1	2	0	6	1	3	94
St. Joseph	0	------	0	1	1	0	0	0	0	1	28
St. Louis	0	------	0	1	4	4	0	7	2	17	174
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	1	5
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	2	0	0	0	0	0	0	13
South Dakota:											
Aberdeen	0	------	------	9	------	0	7	------	0	0	------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	9
Nebraska:											
Lincoln	0	------	------	3	------	0	0	------	0	26	------
Omaha	0	------	0	2	2	1	0	1	0	0	51
Kansas:											
Lawrence	0	------	0	0	0	1	0	0	0	0	3
Topeka	0	------	0	1	1	0	0	0	0	1	18
Wichita	0	------	0	1	2	2	0	1	0	0	45
Delaware:											
Wilmington	0	------	0	1	1	0	0	0	0	3	26
Maryland:											
Baltimore	2	2	1	6	3	2	0	7	0	35	183
Cumberland	0	------	0	0	0	0	0	0	0	0	6
Frederick	0	------	0	12	1	0	0	0	0	0	4
District of Columbia:											
Washington	0	------	0	47	4	3	0	7	0	29	136
Virginia:											
Lynchburg	0	------	0	7	1	0	0	0	2	31	8
Norfolk	0	------	0	1	0	0	0	1	1	3	18
Richmond	0	------	0	26	2	0	0	3	1	6	46
Roanoke	0	------	0	0	1	0	0	1	0	0	16

City reports for week ended July 8, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
West Virginia:											
Charleston	0	-	0	0	0	1	0	0	1	0	10
Huntington	0	-	-	0	-	0	0	-	0	0	-
Wheeling	0	-	0	0	0	0	0	1	1	6	21
North Carolina:											
Gastonia	0	-	-	0	-	0	0	-	0	0	-
Raleigh	0	-	0	0	0	0	0	2	0	0	12
Wilmington	0	-	0	1	0	0	0	0	0	0	8
Winston-Salem	-	-	-	-	-	-	-	-	-	-	-
South Carolina:											
Charleston	0	3	0	0	0	0	0	0	0	0	21
Florence	0	-	0	0	1	0	0	0	0	0	6
Greenville	0	-	0	0	1	0	0	0	0	0	17
Georgia:											
Atlanta	1	1	1	0	4	0	0	5	1	0	89
Brunswick	0	-	0	0	1	0	0	0	0	0	2
Savannah	0	-	0	0	-	0	0	4	0	11	28
Florida:											
Miami	0	-	0	0	1	1	0	1	0	0	22
Tampa	0	-	0	5	1	0	0	1	0	0	18
Kentucky:											
Ashland	0	-	0	0	0	0	0	0	0	0	4
Covington	0	-	0	0	1	0	0	4	0	0	12
Lexington	0	-	0	3	0	0	0	1	0	1	18
Louisville	1	-	0	0	2	0	0	4	1	11	52
Tennessee:											
Knoxville	0	-	0	0	1	0	0	0	0	0	21
Memphis	0	-	0	0	2	2	0	5	2	18	62
Nashville	0	-	0	0	0	0	0	3	1	8	53
Alabama:											
Birmingham	1	-	2	0	2	0	0	4	0	1	57
Mobile	0	-	0	0	1	0	0	1	0	0	21
Montgomery	0	-	-	0	-	0	0	-	0	0	-
Arkansas:											
Fort Smith	0	-	-	0	-	0	0	-	1	0	-
Little Rock	0	-	0	0	0	0	0	2	1	1	-
Louisiana:											
Lake Charles	0	-	0	1	0	0	0	0	1	0	2
New Orleans	2	1	1	1	9	4	0	9	2	8	140
Shreveport	2	-	0	1	9	0	0	3	0	1	67
Oklahoma:											
Oklahoma City	0	-	0	0	4	1	0	2	0	3	36
Tulsa	0	-	-	0	-	0	0	-	0	2	-
Texas:											
Dallas	3	1	0	6	1	1	0	3	0	0	68
Fort Worth	0	-	0	3	2	1	0	2	2	0	37
Galveston	1	-	0	3	1	1	0	0	0	0	16
Houston	3	-	0	3	3	2	0	4	0	0	64
San Antonio	0	-	0	0	2	0	0	7	0	0	89
Montana:											
Billings	0	-	0	0	0	0	0	1	0	0	16
Great Falls	0	-	0	18	0	0	0	0	0	0	5
Helena	0	-	0	0	0	0	0	0	0	0	4
Missoula	0	-	0	0	0	0	0	0	0	0	2
Idaho:											
Boise	0	-	0	0	0	0	0	0	0	0	2
Colorado:											
Colorado Springs	1	-	0	0	0	0	0	2	0	0	10
Denver	4	-	0	15	1	3	0	1	0	13	69
Pueblo	1	-	0	1	2	0	0	0	0	13	13
Mew Mexico:											
Albuquerque	0	-	0	0	0	0	0	1	0	3	14
Utah:											
Salt Lake City	0	-	0	7	0	2	0	1	0	28	88
Washington:											
Seattle	2	-	0	185	2	2	0	7	0	2	89
Spokane	0	-	0	18	0	0	0	0	0	0	16
Tacoma	1	-	0	4	1	2	0	0	0	0	22
Oregon:											
Portland	0	-	0	4	6	4	0	0	0	2	62
Salem	0	-	-	1	-	0	0	-	0	0	-
California:											
Los Angeles	7	-	0	68	11	10	0	23	0	14	285
Sacramento	0	-	0	8	1	1	0	0	0	2	26
San Francisco	4	1	3	2	7	6	0	3	0	5	135

City reports for week ended July 8, 1939—Continued

State and city	Meningitis, meningococcus		Polio-myelitis cases	State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Maine:				Virginia:			
Portland	0	0	1	Norfolk	0	0	1
New York:				South Carolina:			
Buffalo	1	1	0	Charleston	0	0	8
New York	0	0	1	Georgia:			
Rochester	0	0	2	Atlanta	1	0	5
Syracuse	1	1	0	Kentucky:			
Pennsylvania:				Louisville	1	0	0
Philadelphia	0	0	2	Tennessee:			
Ohio:				Nashville	0	0	1
Cincinnati	1	0	0	Oklahoma:			
Cleveland	0	0	1	Tulsa	0	0	1
Toledo	0	0	1	Texas:			
Michigan:				Dallas	0	0	1
Detroit	0	0	5	San Antonio	0	0	2
Wisconsin:				California:			
Madison	0	0	1	Los Angeles	0	0	5

Encephalitis, epidemic or lethargic.—Cases: St. Paul, 1; Topeka, 1.

Pellagra.—Cases: Philadelphia, 1; Wilmington, N. C., 1; Charleston, S. C., 2; Savannah, 5; Nashville, 1; Los Angeles, 1.

Typhus fever.—Cases: Baltimore, 1; Savannah, 1; Mobile, 1; Lake Charles, 1; New Orleans, 1; Fort Worth, 1; Houston, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended June 24, 1939.—During the week ended June 24, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1	2			1			4
Chickenpox	36	[1] 30	46	199	21	8	22	38	400
Diphtheria	1		23	3	2	1			30
Influenza	3			8	1			21	33
Measles	8	[1] 20	96	795	34	2		7	962
Mumps	1		19	62	33			6	121
Pneumonia	12			11	1	1	1	13	39
Poliomyelitis			1	3	1		1		6
Scarlet fever	3	36	15	98	11	5	11	9	188
Smallpox					1		22		23
Trachoma					3	1	1		5
Tuberculosis	24	9	34	53	4	18			142
Typhoid and paratyphoid fever		1	15	3			1	1	21
Whooping cough	33	[1] 17	12	101	12	22	11	52	260

[1] Delayed reports, cases reported occurred since Jan. 1, 1939.

NOTE.—Prince Edward Island reported no cases of any of the above diseases.

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended April 1, 1939.—During the 13 weeks ended April 1, 1939, cases of certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	14,678	Puerperal pyrexia	2,341
Dysentery	466	Scarlet fever	21,698
Ophthalmia neonatorum	1,170	Smallpox	1
Pneumonia	19,868	Typhoid fever	249

England and Wales—Vital statistics—First quarter 1939.—During the first quarter ended March 31, 1939, 153,547 live births and 154,158 deaths were registered in England and Wales. The following statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General, and are provisional:

Birth and death rates in England and Wales, quarter ended Mar. 31, 1939

Annual rates per 1,000 population:	
Live births	15.1
Stillbirths	.62
Deaths, all causes	15.2
Deaths under 1 year of age	[1] 65
Deaths from:	
Diarrhea and enteritis (under 2 years of age)	[1] 5.5
Diphtheria	.07
Influenza	0.61
Measles	.01
Scarlet fever	.01
Typhoid and paratyphoid fever	.00
Whooping cough	.04

[1] Per 1,000 live births.

ITALY

Communicable diseases—4 weeks ended April 23, 1939.—During the 4 weeks ended April 23, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	Mar. 27-Apr. 2	Apr. 3-9	Apr. 10-16	Apr. 17-23
Anthrax	14	3	7	12
Cerebrospinal meningitis	37	41	60	43
Chickenpox	526	539	552	693
Diphtheria	477	432	437	391
Dysentery (amoebic)	16	8	13	8
Dysentery (bacillary)	3	1	1	
Hookworm disease	31	22	19	14
Lethargic encephalitis	1	1		1
Measles	1,765	1,705	1,867	2,031
Mumps	266	257	270	318
Paratyphoid fever	45	37	35	34
Pellagra	2	4	20	69
Poliomyelitis	24	19	25	20
Puerperal fever	22	26	16	15
Scarlet fever	291	273	273	291
Typhoid fever	259	217	197	182
Undulant fever	103	102	120	138
Whooping cough	332	304	407	564

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended—												
						April 1939					May 1939				June 1939			
						1	8	15	22	29	6	13	20	27	3	10	17	24
Afghanistan: Kandahar Province—Greshk.[1]																		
China:																		
Canton	C												P	9				
	D													6				
Fatshan	C												P					
	D													154				
Foochow	C	118	6															
	D	7	2															
Hainan Island	C												P					
Honan	C												P					
Hong Kong	C	11	5								2	4	9	10	16	27	20	50
	D	9	2								1	2	10	6	9	13	20	38
Macao	C	1							1			1	9	10	9	20	30	
	D	1										1	5	6	6	11	16	
Shanghai	C	10														1		
Swatow	C	1																
Whampoa	C												P					
Yunnanfu.[2]																		
India	C	6,004	3,871	4,915	6,667	587	3,205	3,028	3,067	2,009	1,772	1,827	1,918					
	D	3,978	1,924	2,567	3,013	242	1,326	1,425	1,581	928	887	807	891					
Akyab	C										1				1			
Allahabad	C				[3] 1									1				[4] 1
Assam	C	2,863	427	113	238	59	53	50	33	25	35	69	185	116	115	105	58	43
	D	1,838	295	67	98	26	20	25	21	13	17	26	75	38	39	41	23	14
Bassein	C				1		1		1		2		2	2	3	1	[4] 1	
Bengal Presidency	C	14,235	4,477	3,157	4,941	1,816	2,132	1,882	1,922	1,002	911	915	699	668	550	466	430	594
	D	8,073	2,307	1,606	2,297	788	940	917	1,043	486	449	417	337	301	248	199	198	229
Bombay Presidency	C	513	258	205	98	36	37	34	31	19	23	44	67	62	35			
	D	181	111	87	34	13	17	13	8	10	9	20	30	24	16			
Calcutta	C	114	59	118	315	147	219	208	190	199	196	245	196	184		140	111	243

[1] During the week ended July 1, 1939, 5 cases of cholera were reported in Greshk, Afghanistan.
[2] Information dated Nov. 30, 1938, stated that cholera had appeared in villages near Yunnanfu, China. In 1 village of approximately 1,000 persons, 500 were said to have died.
[3] Suspected.
[4] Imported.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939 1	8	15	22	29	May 1939 6	13	20	27	June 1939 3	10	17	24
India—Continued.																		
Cawnpore	C				3				2	1		1	3		3	2	1	4
	D				1							1		1		1	1	2
Central Provinces and Berar	C	228	95	61	71	17	47	37	44	39	55	57	39	43	7	11	7	9
Chittagong	C	1			2	2		1	3	6	[4] 1	2	5	1	1	1		[4] 1
Delhi	D								[4] 1									
Howrah	C	168	98	255	482	141	143	211	164	126	123	95	94	103				
Madras Presidency	C	568	1,464	997	201	35	40		7	1	6	20	24	10				
	D	211	627	496	93	12	14		2	2	3	4	9	8				
Madras	C	3		3	2												1	
	D	1		2														
Negapatam	C	7	2															
	D	2																
Orissa Province	C	20	36	73	56	11	19	29	58	44	27	46	7	31	25	40	64	41
Rangoon	C									4	7		2		2		[4] 1	1
Tirumalaivasal	C			5														
India (French):																		
Chandernagor Territory	C		2	1	16	5	6	6	2	3								
Karikal Territory	C	1	5	41														
Pondichery Province	C							1										
Iran: Zabol.[5]																		
Siam:																		
Bangkok	C						[4] 1		1	2		1						
Smud Prakar Province	C				5	5	7	1										
On vessel:																		
S. S. *Erinpura* at Rangoon from Calcutta	C												1					
S. S. *Amra* at Calcutta from Rangoon	C															1		

[4] Imported.
[5] During the week ended July 1, 1939, 10 cases of cholera were reported in Zabol, Iran.

PLAGUE[1]

Algeria: Algiers	C				1													
Belgian Congo	C	1			3						1	4	2	11				
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa:																		
Kenya	C	1		3														
Uganda	C	9	14	30	24	6		5	2	4	2	3	4	8	2			
	D	9	14	29	24	6		5	2	4	2	3	4	8	2			
China: Manchuria.[2]																		
Dutch East Indies: Java and Madura	C	135	252	259	236	42	48	30										
	D	135	242	256	232	41	48	30										
Ecuador:																		
Chimborazo Province	C				6	[3] 8	7	[3] 3										
Riobamba	C			[3] 16														
	D			15														
Guayaquil	C				1				2									
	D								2									
Plague-infected rats				1	3													
Loja	C			[4] 4														
Pueblo Viejo	C			3														
Egypt: Asyut Province	C		1	[5] 32	22	5		10	7	13	3	3	1	3	2			
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector		40									1							
Honokaa						1												
Kaiwiki		1																
Kapulena								1		1							1	
Kukaiau		10	6	1	3													
Paauhau Sector		7	3	1	5													
India	C	1,931	2,015	3,443	5,718	3,307	4,628	1,170	931	495	319	207	114					
	D	872	970	1,391	2,636	628	1,061	527	595	307	266	118	63					
Allahabad	D			[6] 1														
Bassein	C				3											1		
Plague-infected rats					1													
Bihar Province	C											1	12					
	D											1	1	7				
Bombay Presidency	C	101	51	27	33	11	8	9	13	5	4	3	1	3	3			
	D	61	29	13	20	7	5	3	3	5	4	2	1	1	1			
Calcutta	C					[6] 1												
Calicut	C											1						
Central Provinces and Berar	C	677	715	1,414	2,056	454	608	557	295		132	37	27	2	3			
Cochin: Plague-infected rats		6	1															
Coorg Province	C								4			1					1	

[1] Including plague in the United States and its possessions.
[2] Information dated May 5 stated that 34 cases of plague with 8 deaths had occurred in Hsinking, Manchuria, since the beginning of the year.
[3] Pneumonic.
[4] Unofficially reported.
[5] Includes 4 pneumonic cases.
[6] Imported.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939					May 1939				June 1939			
						1	8	15	22	29	6	13	20	27	3	10	17	24
India—Continued																		
Madras Presidency	C	135	140	164	28	10	3		1	1	3		2	8				
	D	61	53	64	19	7			1		1		2	5				
Rangoon	C		3	[6] 1														1
	D		2															1
Indochina (see also table below):																		
Cambodia	C															1		
Pnom Penh	C									1								
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Siam:																		
Bichitr Province	C											3	1					
	D											1						
Bisnulok Province	C		1	33	1													
	D		1	5														
Lampang Province	C			1														
Prae	C		3				1	2										
Svargalok Province	C		11	17	2													
Tak Province	C	3	7	3														
Tunisia: Tunis	C	2						1										
Plague infected rats			2	3														
Union of South Africa	C	2	8	18	22		[7] 6		[7] 3									
Cape Province	C		2	7	4		2		2		1							
Port Elizabeth	C	1																
	D	1																
Orange Free State	C	5		4	6		1		[7] 6									
Transvaal	C				7													
United States.[8]																		

[6] Imported.
[7] For 2 weeks.
[8] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1938 and 1939: *California*—Ground squirrels, December 1938; Mar. and Apr. 18, 25, and 26, 1939; insects, December 1938, March and June 8, 1939; *Idaho*—Insects, June 14, 1939; *Nevada*—Insects, Apr. 7-8, 1939; *New Mexico*—Kangaroo rat, Apr. 15, 1939; *Oregon*—Ground squirrels, June 4, 1939, insects, May and June 4, 1939; *Washington*—Rabbit, May 27, 1939, insects, March, April, and May 25 and 27, 1939.

Place		December 1938	January 1939	February 1939	March 1939	April 1939	May 1939
Bolivia	C				[3]1		
Brazil:							
Alagoas State	C	5	19	5	11	1	
Bahia State	C				1		
Parahiba State	C	1	1				
Pernambuco State	C	17	15	3	5	6	
Rio de Janeiro State	C	1					
Indochina: Cambodia	C			2			
Madagascar (central region)	C	107	79	77	52	33	11
	D	102	42	67	21	25	9
Peru	C	7	14	9	12	11	11
Cajamarca Department	C				3		
Lambayeque Department	C	1	2		1	1	1
Libertad Department	C	2	11	4	1	2	3
Lima Department	C	4	1	4	2	1	
Piura Department	C			1	5	7	7

[3] Pneumonie.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939: 1	8	15	22	29	May 1939: 6	13	20	27	June 1939: 3	10	17	24
Algeria: Oran Department	C							1						2				
Angola. (See table below.)																		
Arabia: Aden	D			1														
Argentina. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa: Tanganyika	C		1	174	96	50	24	15	32	25		3		6	17		5	
Canada:																		
Alberta	C			37	7													
British Columbia	C			4	8													22
Manitoba	C	[1] 1	8	1	22			1	8	4	2							
Ontario	C	2		1														1
Saskatchewan	C	5	17	10	2													
Canary Islands: Las Palmas	C				3													
Ceylon: Maskeliya	C				[2] 1													
China (see also table below):																		
Dairen	C	2	1		2	1	2	1				1	1	3	1	1		
Foochow	C		8		2		4		4		5	3						
Hong Kong	C	30	18	45	45	12	9	5	4	4	3	2	5	1	1			
	D	23	13	23	49	6	6	4	5	5	5	2	1	3	1			
Macao	C			3														
Shanghai	C	1,264	834	274	102	10	13	10	7	5	9	4	1	4	2	2	1	3
Swatow	C		1	3	2	3	1		2	1								
Tientsin	C	2		1		1			2	1			1					
Chosen (Korea). (See table below.)																		
Colombia (see also table below): Cartagena	D			1	2			1										
Dahomey. (See table below.)																		
Dutch East Indies: Surabaya	C	[2] 1																
Ecuador: Guayaquil (see also table below)	C				4				1									3
	D				1				1									1
France. (See table below.)																		
French Equatorial Africa: Chad	C								14									
Great Britain: England and Wales—Liverpool	C	1	1															
Greece. (See table below.)																		
Guatemala. (See table below.)																		

India	C	5,335	7,797	11,353	15,237	1,407	1,661	5,508	4,998	5,006	4,109	4,690	4,682					
	D	1,377	1,777	2,536	3,254	627	840	1,245	1,138	1,045	1,003	1,014	1,063					
Allahabad	C		1		2								1					
Assam	C	80	67	58	121	46	14	35	47	83	59	56	87	50	24	36	35	32
Bengal Presidency	C	300	572	1,735	2,152	687	642	631	795	550	411	488	399	328	230	202	184	165
	D	83	203	632	724	232	203	258	308	211	166	169	136	134	87	78	60	70
Bihar Province	C											603	853	903	672			
Bombay Presidency	C	681	1,388	1,514	3,936	1,120	1,228	1,634	1,105	1,311	1,111	1,010	987	953	806			
	D	91	187	220	558	175	150	248	192	196	155	152	136	155	118			
Bombay	C	2	12	20	56	11	17	20	8	5	9	12	6	14	9	12	9	10
	D	1	8	11	21	2	4	6	6	2	4	6	2	5	7	5	6	3
Calcutta	C	116	400	776	806	184	186	205	177	158	100	70	59	69	34	40	22	31
	D	66	231	451	548	141	125	168	129	113	78	54	52	51	25	31	17	22
Cawnpore	C		4	2	5	4	1	5	3	1	7	4	2	3	1		2	
Central Provinces and Berar	C	46	81	198	540	245	178	219	281	209	184	203	284	233	265	154	174	164
Chittagong	C			1														
Cochin	C	1		4			2	1										1
Delhi	C	23	96	113	133	38	36	34	39	40	44	47	48	64	39	23	15	22
Howrah	C	21	67	148	152		86	56	47	33	31	43	29					
Jodhpur	D											19	9	10		3	3	1
Karachi	C	[1] 3	3	3	3	1			2		1	4	1	2	1			
Madras Presidency	C	893	1,058	1,389	1,400	249	325		297	149	180	170	101	94				
	D	168	370	233	234	57	69		57	58	51	41	35	28				
Madras	C	186	171	304	236	49	39	37	36	32	18	8	2	4	5	5		2
Moulmein	C		1															
Northwest Frontier Province	C	290	155	113	114	15	30	28	3	34	19	10	10	47	62	37	54	12
Orissa Province	C	208	338	465	699	192	205	187	237	218	290	155	140	137	84	117	89	86
Punjab	C	135	196	329	180	63	67	25	36		61		41	112	97	72	45	
Rangoon	C	2	9	5	14	5	3			2	4	3	5	2	6	2	2	
Sind State	C	302	158	299	279	58	38	25	48	82	58	60	42	49		44	64	23
Vizagapatam	C					3	2	1										
India (French):																		
Chandernagor Territory	C	1		2		1	1		1	1	3							
Pondichery Territory	C			6	7		1			2								
	D			4	3		1			1								
Indochina (French) (see also table below):																		
Tonkin Province	C	267	214	183	211	29	59	52	27	61	73		33	29	20	20	14	
Haiphong	C			2														
Hanoi	C		1	10	6	1	1		3	8	4		7	11		3		
Saigon-Cholon	C	12	6	3														
Iran	C	1	1		11	6				4		3						
Iraq	C	1	6	1			5			1					2		2	
Baghdad	C											[2] 1						
Ivory Coast. (See table below.)																		
Japan:																		
Kanagawa prefecture	C		1															
Kobe	C	3	4	66	16													
Kyoto	C		13	1														
Nagasaki	C	7																
Nagoya	C				1													
Okayama prefecture	C	1																

[1] For 2 weeks.

[2] Imported.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939					May 1939				June 1939			
						1	8	15	22	29	6	13	20	27	3	10	17	24
Japan—Continued																		
Osaka	C			1	1					1	1	1	2	1		1		
Taiwan.[3]																		
Tokyo	C	2		5					1									
Malta. (See table below.)																		
Mexico (see also table below):																		
Mexico, D. F	C	1	1	3	6	1	2											
Monterrey	C		4	2	1	1												
Piedras Negras	D				1													
San Luis Potosi	D			5	3			1						1			3	1
Tampico	C			7	22	1												
Morocco. (See table below.)																		
Mozambique	C				11						4	12	9	7	1			
Nigeria	C	182	320	984	881	267	224	233	197	340	209	197	79	29	16			
Calabar	C		1	6	5	1		2			42	2						
Lagos	C				1						2		2					
Port Harcourt	C		3	1	1													
Niger Territory. (See table below.)																		
Northern Rhodesia	C	6																
Portugal (see also table below):																		
Lisbon	C	6	42	21	21	10	7	6	7	4	8	7	4	14	17	13	9	14
Oporto	C	5	5	14	2					2		7	1		1	2	5	2
Portuguese Guinea. (See table below.)																		
Salvador. (See table below.)																		
Senegal. (See table below.)																		
Siam	C	6	48		2			1		1					1			
Sierra Leone	C	2	4	9	2				8		9							
Southern Rhodesia	C	30	37	48			9			12		1	9	1				
Straits Settlements: Singapore	C				1													
Sudan (Anglo-Egyptian)	C	31	28	18	17	5	3	8	65	9	6	1		5	7	1	5	2
Syria: Aleppo	C				1													
Turkey. (See table below.)																		
Union of South Africa. (See table below.)																		
Uruguay: Artigas	C				1													
Venezuela. (See table below.)																		

[3] Information dated Apr. 6, 1939, states that up to Mar. 31, 1939, 61 cases of smallpox were reported in Taiwan, Japan.

On vessels:

S. S. *Hartlebury* bound for New York via Durban [4]	1 case	Dec. 1, 1938
S. S. *Nagasaki Maru* at Nagasaki from Shanghai	1 case	Dec. 7, 1938
S. S. *Pyrrhus* at Yokohama from Shanghai	1 case	Dec. 10, 1938
S. S. *Westpoint* at sea en route Surabaya	1 death	Do.
S. S. *Tyles* at Yokohama from Hong Kong and Shanghai	1 case	Dec. 13, 1938
S. S. *Nagasaki Maru* at Nagasaki from Shanghai	1 case	Dec. 16, 1938
S. S. *Bellerophon* at Hong Kong from Yokohama, Kobe, and Shanghai	1 case	Dec. 22, 1938
S. S. *Selandia* at Singapore from Saigon	1 case	Jan. 15, 1939
S. S. *Pottsdam* at Singapore from Yokohama	1 case	Jan. 17, 1939
S. S. *E. Sang* at Swatow from Shanghai	1 case	Jan. 18, 1939
S. S. *Maihar* at Aden from Calcutta	1 case	Jan. 30, 1939

[4] Patient removed from vessel and died in hospital in Iloilo district, P. I.

On vessels:—Continued.

S. S. *Alavi* at Aden from Bombay	1 case	Feb. 2, 1939
S. S. *Orange Moor* at Saigon from Shanghai	1 case	Do.
S. S. *Queen Victoria* at Victoria from Shanghai	1 death	Feb. 6, 1939
S. S. *Rugelsey* at Williamshead from Shanghai	10 cases	Feb. 19, 1939
Pilgrim ship *Tantalus* at Penang from Jeddah	1 case	Feb. 27, 1939
Pilgrim ship *Ajax* at Penang from Jeddah	1 case	Mar. 2, 1939
S. S. *Gneisenan* at Genoa	1 case	Mar. 5, 1939
S. S. *Riley* at Fremantle from Shanghai	1 case	Do.
S. S. *Mau Sang* at Sandakan from Hong Kong	1 case	Apr. 6, 1939
S. S. *Thisteleglen* at Singapore	1 case	Apr. 10, 1939
S. S. *Empress of Russia* at Hong Kong from Shanghai	2 cases	Apr. 20, 1939
S. S. *Liebenfels* at Rangoon from Moulmein	1 case	June 2, 1939

Place		December 1938	January 1939	February 1939	March 1939	April 1939	May 1939
Angola	C	27					
Argentina	C			3			
Belgian Congo	C	211	175	26			
Bolivia:							
Cochabamba Department	C				8		
La Paz Department	C				8		
Oruro Department	C				1		
Potosi Department	C				1		
Santa Cruz Department	C				6		
Brazil: Bahia	C	1					
China: Harbin	C		2	1	5	5	1
Chosen (Korea)	C				42		
Colombia (see also table above)	C	[5] 122	25				
Dahomey	C	14	12		4		
Ecuador: Guayaquil and vicinity	C	2					
France	C		1	3			
Greece	C	5	12	1	38	7	
Guatemala	C			5		4	
Indochina (French) (see also table above)	C	475	312	163	515	606	671
	D	65	47	21	79	52	109
Ivory Coast	C		18	59	17		
Malta	C	9					

[5] For November and December 1938.

Place		December 1938	January 1939	February 1939	March 1939	April 1939	May 1939
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C	6		[6] 15	3		
Chihuahua State—Chihuahua	C			[6] 1			
Hidalgo State	C	36		[6] 29	7		
Jalisco State—Guadalajara	C			[6] 1			
Mexico, D. F	C	6		[6] 7	9		
Nuevo Leon State—Monterrey	C				3		
Queretaro State	C			[6] 1			
San Luis Potosi State—San Luis Potosi	C			[6] 16	11		
Sonora State—Guaymas	C				1		
Tamaulipas State—Tampico	C			[6] 9	15		
Morocco	C	4	2		1		6
Niger Territory	C		48	34	40	9	
Portugal (see also table above)	C	62			112		
	D	12			11		
Portuguese Guinea	C					115	
	D					8	
Salvador	C				1		
Senegal	C			35	66	42	55
Turkey	C		58	8		59	34
Union of South Africa:							
Cape Province	C	1					
Transvaal	C	37					
Venezuela	D	1	2	8	6	3	7

[6] For January and February 1939.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Week ended— March 1939				April 1939					May 1939				June 1939			
					4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24
Algeria:																					
Algiers Department	C	27	9	14	7	5	13	4	6		6	1	8		11		15	12	28	25	
Algiers	C	5	2			5	8	3					5		10		12	7		7	
Constantine Department	C	44	115	90	36	18	53	57	30	19	38	54	54	69	13		103	43	43	56	
Bone	C		4				2		1			5	3	1							
Constantine	C	7	11	8	1	4		2		4	8	27		10	8		34	3		31	
Philippeville	C	3	3	1				14		2				2			7	4		1	
Oran Department	C	5	28	29	4	10	9	6	2	7	2	4	16	6	2		20	7	5	21	
Southern Territories	C			7	2	1	17	1	9		1	9	3		36		26	17		4	
Australia:																					
Brisbane	C					1															
Queensland	C			5					3	1	1				1						
Bolivia. (See table below.)																					
British East Africa: Kenya	C	3		1							1										
Bulgaria. (See table below.)																					
Chile	C	147	80	49	13	12	12	6	9	2		6									
Antofagasta Province	C		2	1																	
Bio Bio Province	C		2	4		2	3					1									
Cautin Province	C			2		1															
Coquimbo Province	C			12		2															
Curico Province	C		15	1																	
Los Angeles	C		9																		
Nuble Province	C	3	2	1								2									
Santiago Province	C	81	50	40	9	7	4	5													
Valdivia Province	C	2	1	1					1												
Valparaiso	C	5		1											1						
China (see also table below):																					
Dairen	C	1														1	1				
Shanghai	C		6											2							
Tientsin	C		2						1				2		1						
Chosen (Korea). (See table below.)																					
Egypt:																					
Alexandria	C	2			1			2	4	2	1		6	5	8	3	10	9	3		
Asyut Province	C		1	4					2			1	11	8	2	1	4	3			
Beheira Province	C		1	24	14	14	10	6	22	17	13	29	28	20	10	8	26	7	6		
Cairo	C	2	3	18	7	14	9	1	6	2	3	12	4	2	1	2	4	2			3
Dakahliya Province	C			11	14	30	16	46	25	20	36	51	46	49	44	48	55	54	37		
Faiyum Province	C										7										

Gharbiya Province	C		15	51	82	53	43	67	64	104	97	48	42	50	34	76	56	45	39		
Girga Province	C		4	58	17	12	5	13	14	12	3	12	1	3	4	7	17	18	7		
Giza Province	C			19	8	2	6		8	2	8	21	14	9		9	4	8	11		
Kalyubiya Province	C			33	25	28	11	20	3	8	3	12	18	6	8	10	21	16	5		
Minufiya Province	C		3	67	36	16	18	31	9	6	11	25	45	40	45	19	37	21	12		
Qena Province	C							47	61	18	13	20	15	6	4	1	10	2	4		
Sharkiya Province	C			17	14	10	17	5	11	25	6	12	12	4	5		15	11	5		
Provinces	C	43	70	323	212	155	145	236	229	216	199	234	232	195	200	186	247	186	126	90	59
Eritrea: Hamasien	C						2	2													
Greece. (See table below.)																					
Guatemala. (See table below.)																					
Hawaii Territory: Honolulu	C	7	1	1		1								1						1	
Hungary	C	3	1					5		4			5								
India: Coorg Province	C						5				3								3		
Iran	C			1							1			2	9		7				
Iraq	C	2		2																	
Arbil Province	C																1	2		1	1
Baghdad	C				1							1	2	1	1						1
Kirkuk Province	C			1													7				
Irish Free State: Louth County—Drogheda.[1]																					
Latvia. (See table below.)																					
Libya: Suani Benaden	C		3																		
Lithuania. (See table below.)																					
Mexico (see also table below):																					
Guadalajara	D	1																			
Mexico, D. F.	C	9	5	4	1	1			4	1											
Monterrey	C																1				3
Nuevo Laredo	D																				
San Luis Potosi	D	1								1				1							
Torreon	D	1		1								2		1							
Morocco	C	117	111	152	35	44	51	47	41	26	42	47	37	45	36	42	22	28	30	29	
Casablanca	C		1	6	4	1	1	2	2	2	4	4						1			
Palestine:																					
Haifa	C	1		1									2		2	1	1			3	
Jaffa	C	6	3					1			1						2			3	
Poland	C	321	357	463	139	135	171	135	145	165	151	158	167	109	99	104	125	97	81	71	
	D	20	14	20	5	7	6	5	10	6	5	7	6	6	5		1	3	6	2	
Portugal: Oporto (see also table below)	C		2								2	1									
Portuguese East Africa: Laurenco Marques	C						2														
Rumania. (See table below.)																					
Spain. (See table below.)																					
Straits Settlements: Singapore	C		2	5		1					1										
Sumatra: Medan	D			1																	
Swaziland. (See table below.)																					
Syria:																					
Aleppo	C			2																	
Beirut	C	1						1													
Lebanese Republic	C								1				1								

[1] During the week ended July 1, 1939, 5 cases of typhus fever were reported in Drogheda, Louth County, Irish Free State.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Week ended— March 1939: 4	11	18	25	April 1939: 1	8	15	22	29	May 1939: 6	13	20	27	3	10	June 1939: 17	24
Trans-Jordan	C											7	1	5	1	3			1		
Tunisia:																					
Tunis	C	42	43	33	16	14	12	22	32	21	8	16	12	6	13	16	4	1	13	2	2
Provinces	C	261	436	506	109	191	206	188	185	93	221	282	292	264	248	271	223	202	228	316	221
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Venezuela. (See table below.)																					
Yugoslavia	C	25	21	38		11	29	9	12	13	3	56	31	13	25	19	5	10	3		
On vessel: S. S. *Stanbrook* at Mers el Kebir	C												1								

Place		December 1938	January 1939	February 1939	March 1939	April 1939	May 1939
Bolivia:							
Cochabamba Department	C				1		
Potosi Department	C				7		
Tarija Department	C				1		
Bulgaria	C	2	8			14	
China: Manchuria—Harbin	C		5		23	4	16
Chosen (Korea)	C		78	9	106		
Greece	C	8	9				
Guatemala	C	2	9	22	25	14	4
Latvia	C		2			1	
Lithuania	C		30	42	32	23	6
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C	2		[1] 11	2		
Hidalgo State	C	1		[1] 2	1		
Mexico State	C			[1] 8			
Mexico, D. F.	C	6	2	[1] 14	9		
Mexico—Continued.							
Queretaro State	C	1		[1] 4			
San Luis Potosi State—San Luis Potosi	C	5		[1] 8	3		
Tamaulipas State	C			[1] 1			
Portugal (see also table above)	C	3					
Rumania	C	100	144	121	205	78	
Spain	C					4	
Swaziland	C		1				
Turkey	C	49	32	46	57	62	49
Istanbul	C	4	6		4	4	
Union of South Africa:							
Cape Province	C	93	23	25	17	32	
Natal	C	1	1	3	2	25	
Orange Free State	C			1	3	4	
Transvaal	C		26		16	16	
Venezuela: Bolivar	C					1	3

[1] For January and February 1939.

YELLOW FEVER

[C, indicates cases: D, deaths: P, percent]

Place		Nov. 27–Dec. 31, 1938	Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Week ended— March 1939 4	11	18	25	April 1939 1	8	15	22	29	May 1939 6	13	20	27	June 1939 3	10
Brazil: [1]																			
Espirito Santo State	D		4	42	5	6	6	4	9	6	5	7	1				[2] 1		
Minas Geraes State	D			5	2		1			1		1							
Para State	D																[2] 1		
Rio de Janeiro State	D		2				1												
Colombia: Antioquia Department—Caracoli	D																	1	
French Equatorial Africa: [3] Chad—Fort Lamy	C		1																
Gold Coast	C			[4] 1							1							1	
Ivory Coast	C	[5] 5		3						[4] 2		1		[4] 3			2	2	[6] 8
	D	2		1															
Nigeria	C	3	2	2				1											
	D		1	2															
Niger Territory: Tahua	C																[4] 1		
Sudan (French): Sangha	C	1																	

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type.
[3] For the week ended July 15, 1939, 1 suspected death from yellow fever was reported in Port Gentil, Gabon, French Equatorial Africa.
[4] Suspected.
[5] Includes 2 suspected cases.
[6] Includes 4 suspected cases.

X

Public Health Reports

VOLUME 54 AUGUST 4, 1939 NUMBER 31

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

For the week ended July 29, a total of 177 cases of poliomyelitis was reported in the United States, as compared with 137 cases for the preceding week and with 257 cases for the 1934–38 median. The incidence during the current week was, therefore, about 68 percent of the 5-year median.

The rise in the number of cases reported during the current week is accounted for by an increase of 12 cases in Michigan, which State reported 29 cases as compared with 17 for the preceding week, and by smaller increases in scattered States. Of the cases reported in Michigan, 21 occurred in Detroit.

South Carolina reported 12 cases, the same number as for the preceding week, and the incidence in California dropped from 51 to 46 cases.

In the following article and accompanying table a summary of poliomyelitis incidence, by geographic regions, is given for the 4 weeks ended July 15, and on pages 1456–1457 will be found the reports from States for the week ended July 22.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

June 18–July 15, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended July 15, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—For the 4 weeks ended July 15, there were 1,599 cases of influenza reported, as compared with 1,384, 1,269, and 2,691 cases for the corresponding period in 1938, 1937, and 1936, respectively. The incidence was about 25 percent above the average incidence for this period in recent years. The South Atlantic and Mountain regions were largely responsible for the current excess incidence. In the South Atlantic region the number of cases (695) was almost three times the average seasonal incidence, and in the Mountain region the incidence was about two and one-half times the 1934–38 average incidence.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period June 18–July 15, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	986	1,145	1,249	1,599	1,384	1,269	20,185	32,457	32,457	124	150	296
New England	23	17	59	7	12	5	3,929	2,013	2,772	5	2	7
Middle Atlantic	137	208	289	18	23	22	4,126	10,786	10,052	34	24	72
East North Central	176	235	299	136	108	124	2,029	10,566	10,566	20	25	42
West North Central	63	85	108	108	47	118	950	1,800	1,460	12	11	16
South Atlantic	164	210	180	695	339	237	1,741	3,128	1,694	27	35	53
East South Central	63	78	84	117	91	91	273	547	547	12	38	38
West South Central	196	141	155	299	598	380	1,078	546	546	6	10	18
Mountain	66	77	45	130	71	52	758	1,129	740	2	4	9
Pacific	98	94	111	89	95	133	5,301	1,942	1,959	6	1	21
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	390	157	653	4,732	6,366	8,017	381	648	534	1,369	1,706	1,770
New England	5	9	15	426	758	652	6	0	0	33	20	20
Middle Atlantic	18	18	27	1,247	1,708	2,381	0	0	0	73	95	132
East North Central	32	20	24	1,601	1,962	3,037	104	137	98	100	137	139
West North Central	12	13	11	381	510	751	127	228	220	56	57	114
South Atlantic	148	27	27	230	341	330	6	4	4	415	486	486
East South Central	19	41	41	153	127	127	11	17	5	238	334	345
West South Central	43	13	16	124	262	163	33	52	22	348	438	438
Mountain	20	4	4	181	225	225	34	81	81	54	84	62
Pacific	93	12	44	389	473	584	60	129	70	52	55	55

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria reached a new low level for the current period. The number of cases reported (986) was less than 90 percent of the number reported for this period in 1938, and less than 80 percent of the 1934–38 average incidence. A few more cases than normally occur at this season of the year were reported

from the West South Central and Mountain regions, but in all other regions the incidence was relatively low.

Measles.—The incidence of measles for the country as a whole was relatively low. The number of cases, approximately 20,000, reported for the current period was about 60 percent of the number reported for the corresponding period in 1938, which figure (32,457) also represents the preceding 5-year average incidence for this period. The Pacific region continued to report an unusually large number of cases, and in the West South Central and New England regions the incidence remained considerably above the normal seasonal expectancy, but in other regions the incidence was either about normal or fell considerably below the average of recent years.

Meningococcus meningitis.—The incidence of this disease (124 cases) for the 4 weeks ended July 15 was the lowest reported for this period in the 11 years for which these data are available. Each section of the country shared in the favorable situation that now exists with respect to this disease. The nearest approach to the current low incidence was in 1934, when 134 cases were reported for this period. The current incidence was only about one-half of the 1934–38 median incidence, but there were 3 years during the preceding 5 years in which the incidence of the disease was high, thus establishing a high median level for that period. Since 1936 the number of reported cases has been decreasing.

Poliomyelitis.—During the 4 weeks ended July 15 there were 99 cases of poliomyelitis reported from South Carolina, the same number as that reported during the preceding 4-week period. North Carolina and Georgia, adjoining States, reported 15 and 22 cases, respectively, as against 3 and 10 cases for the preceding 4-week period. An appreciable increase in the number of cases was also reported from California, Texas, and Michigan, but in other States the number of cases reported did not exceed the normal increase of this disease that is expected at this season of the year. The number of cases (390) for the country as a whole was two and one-half times the number reported for this period last year. During 1938 the incidence of poliomyelitis was the lowest in ten years. The average number of cases reported for this period during the years 1934–38 was 653; the current incidence is only about 60 percent of that figure.

Scarlet fever.—The incidence of scarlet fever remained at a comparatively low level. For the current period the reported cases totaled 4,732, as compared with 6,366, 8,017, and 9,638 for the corresponding period in the years 1938, 1937, and 1936, respectively. The East South Central region reported a few more cases than might be expected, but in all other regions the figures represented decreases from last year's figures, as well as very significant decreases from the 1934–38 average figure for this period.

Smallpox.—The number of cases (381) of smallpox reported for the 4 weeks ended July 15 was about 60 percent of the number reported for the corresponding period in 1938, and about 75 percent of the 1934–38 average incidence for this period. Six cases were reported from Connecticut, in the New England region, and the East North Central and South Central regions reported excesses over the average incidence in those regions, but in the West North Central, Mountain, and Pacific regions the incidence was relatively low.

Typhoid fever.—The number of cases of typhoid fever increased about 50 percent during the current period over the preceding 4-week period, but the total number of cases (1,369) was only about 80 percent of the preceding 5-year average incidence for this period. Each section of the country except the New England shared in the favorable situation. In the State of Washington the number of cases dropped from 113 for the 4 weeks ended June 17 to 26 during the current period. An increase in this disease is normally expected at this season of the year and the peak is not usually reached until the latter part of August.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended July 15, based on data received from the Bureau of the Census, was 10.1 per 1,000 inhabitants (annual basis). The average rate for this period for the years 1934–38 was 10.7. The current rate is the lowest since 1933, when the rate for this period was 9.9.

DERMATITIS CAUSED BY A NEW INSECTICIDE

By Louis Schwartz, *Medical Director*, and Leon H. Warren, *Acting Assistant Surgeon, United States Public Health Service*

A chemical company began experiments about a year ago on the manufacture of a new synthetic insecticide. Although it was known that when the insecticide was applied to the skin of experimental warm-blooded animals it would cause dermatitis, there were no cases of dermatitis among the chemists and others who were experimenting with the material during the 6 or 7 months before it was placed on the market. When the production for commercial use was begun, dermatitis broke out among 9 of 12 workers employed in the manufacturing process, and the company was forced to suspend operations pending the installation of safer manufacturing apparatus.

Dermatitis also occurred among the workers in factories to which the product was sold for the purpose of blending with insecticidal spraying solutions. In these factories most of the cases of dermatitis occurred among the workers employed in filling cans with the insecti-

cidal solution. The Labor Department of the State in which the chemical company manufacturing the new insecticide is located requested the United States Public Health Service to investigate the cause of the dermatitis and make recommendations for the safe manufacture of the insecticide.

Most insecticides are either primary skin irritants or sensitizers, and some are both. Insecticidal sprays basically contain pyrethrum dissolved in a petroleum distillate. Other cheaper poisons, such as para-dichlorbenzene, the thiocyanates, derris extract, isobutyl undecylenamid, and the like, are commonly substituted for a portion of the pyrethrum to reduce the cost of manufacture, since pyrethrum is rather expensive. Such substances as citronella and pine oil are added to give the preparation an agreeable odor. Considering the fact that insecticidal sprays are widely used, and that the labels on them usually state that they are nontoxic to human beings, it is remarkable that more cases of dermatitis have not been reported from their use.

Schwartz (*1*) reported an outbreak of dermatitis caused by pyrethrum among the workers in a plant manufacturing a well-known insecticide. Sulzberger and Weinberg (*2*) reported dermatitis in a user of Black Flag, an insect powder containing pyrethrum. Kesten and Laszlo (*3*) also reported dermatitis caused by pyrethrum, but no cases of dermatitis had been reported to be caused by other ingredients of insecticidal sprays.

Many poisonous chemicals are used for insecticidal purposes. The silicofluorides, the chlorobenzols, and naphthalene are used to kill moths and to make fabrics mothproof. The fluorides are used in powder form to kill roaches. The arsenicals, the organic mercury compounds, lime, copper salts, derris root, and nicotine are used as agricultural parasiticides. The chlorophenols, chromates, zinc chloride, coal tar, and creosote oil are used as wood preservatives and termite repellents. All of these substances, except perhaps nicotine, are primary skin irritants if used in strong concentrations. Nicotine is rapidly absorbed through the skin and is a powerful systemic poison.

The new synthetic insecticide which caused the outbreak of dermatitis herein reported is a product known as alpha naphthyl isothiocyanate ($C_9H_{17}NCS$). It is a white crystalline substance with a melting point of 55.5° C. and a boiling point of 142° C. It is but slightly soluble in water (0.0002) at 20° C., but soluble in kerosene up to 12 percent by weight. It has a slight odor, is colorless and nonstaining. It is loosely called mustard oil but differs from true oil of mustard (C_3H_5NCS) which is allyl isothiocyanate.[1] Alpha naphthyl isothiocyanate alone is not sufficiently poisonous to flies to be satisfac-

[1] Mustard oil has no relation to mustard gas ($C_4H_8Cl_2S$), dichlorethyl sulfide, used in warfare.

tory as an insecticide. However, when it is mixed with pyrethrum it has a satisfactory toxic power. Since alpha naphthyl isothiocyanate is much less expensive than pyrethrum, its substitution for a portion of the latter reduces the cost of insecticide manufacture. It is said that by adding 1 percent of alpha naphthyl isothiocyanate to an insecticide about 60 percent of the usual amount of pyrethrum can be eliminated, and the insecticide will still have the desired toxic effect.

MANUFACTURING PROCESS

Alpha naphthyl isothiocyanate is made by allowing carbon disulfide and ammonia to react with alpha naphthylamine in a completely enclosed kettle. Ferrous sulfate solution is added in order to precipitate the resulting compound and the fluid is run through an open filter press, the solid material being scraped off the filters and spread out on trays to dry. The dermatitis was contracted by the men while working on the open filter press and in handling the trays containing the wet and dry crude compound while carrying them into and out of the drying room. The remainder of the manufacturing process consists in purifying the crude material by dissolving in various solvents, such as carbon tetrachloride and acetone, bleaching with sulfuric acid, neutralizing, and filtering in order to remove impurities. It is then ground into a powder and placed in containers for shipment. The crude product as it comes out of the drying room is about 60 percent pure, while the final commercial product is 95 percent pure.

The workers employed in the manufacture of this insecticide were furnished with clean clothes, rubber gloves, and gas masks, and all the operations were completely enclosed except the first filtering, the drying described above, the pouring of the alpha naphthylamine into the kettles containing the carbon disulfide and the ammonia mixture, and the grinding of the commercial product.

Nine to ten days after new men began working in the factory they developed a papulo-vesicular eruption, usually beginning at the wrists or collar line and spreading to other parts of the body. In two of the workers affected, the eruption was accompanied by chills and fever lasting from 3 to 5 days and necessitating the hospitalization of one of them. In the milder cases the dermatitis consisted of an erythema which lasted from 4 to 7 days and then faded. In the severe cases the eruption lasted several weeks and was followed by desquamation.

During the inspection of the factory it was noted that the men rotated from one operation to another, so that all of them were exposed to the chemicals at the open filter, in the drying room, and at the grinders. At the time that the inspection was made the manufacturing operation had been discontinued pending the installation of

totally enclosed machinery, and the workers who had been affected with dermatitis had all recovered.

The impurities in the crude product as it came from the first filter press were suspected by the makers of the insecticide to be the cause of the dermatitis. These impurities consisted of ammonium naphthyl dithiocarbamate, ferrous sulfide, and free sulfur. In order to determine the exact chemical causing the dermatitis, a series of patch tests was performed on six of the workers who had had dermatitis, and on three who had been exposed to the chemical but did not develop any skin lesions. The latter were to serve as controls. The patches were allowed to remain on for 24 hours.

The first patch consisted of the dried crude product which contains about 60 percent of alpha naphthyl isothiocyanate and about 40 percent of impurities. Patch No. 2 consisted of the commercial product containing 95 percent of alpha naphthyl isothiocyanate; patch No. 3 consisted of a 5-percent solution of the commercial product in white mineral oil; patch No. 4 consisted of a 1-percent solution of the commercial product in white mineral oil; patch No. 5 consisted of a 0.5-percent solution of the commercial product in white mineral oil; and patch No. 6 consisted of a 0.25-percent solution of the commercial product in white mineral oil.

Table 1 shows the results of the patch tests. It will be noted that two of the controls showed no reactions to any of the patches, while one of the controls reacted to patch No. 2. Four of those who had dermatitis reacted to patch No. 1 and all of them reacted to patch No. 2; three reacted to patch No. 3; and two reacted to patches Nos. 4, 5, and 6.

It will also be noted from this table that the reactions obtained are in direct proportion to the concentration of the chemical and to the degree of severity of the dermatitis from which the patients had suffered. Thus, the ones with the most severe dermatitis were the ones who reacted to the weaker dilutions of the chemical, and those with the least severe cases reacted only to the stronger dilutions.

The patients were again seen 72 hours after the first patches were removed in order to observe any late reactions which may have developed.

Table 2 shows the reading of the patch tests made 72 hours after the removal of the patches. At that time all the cases showed reactions to patches 1 and 2. In other words, late reactions to patch No. 1 developed in two of the cases of dermatitis and in all three of the controls, and late reactions to patch No. 2 developed in those controls who showed no reaction after 24 hours. It will also be seen that the reactions had increased in severity. Patches 1 and 2 showed actual ulcerations in many of the cases. One of the workers, V. Y., was not seen at the time of the second examination, but the attending physician

stated that he had developed reactions under all the patches, whereas at the 24-hour reading he had reactions only under patches 1 and 2.

TABLE 1.—*History and reactions to patch tests after 24 hours*

Patient	Age	History	Patch test					
			1	2	3	4	5	6
			Crude powder (filter press) (60 percent)	Kess-cocide powder (commercial) (95 percent)	Dilutions in white mineral oil (percent)			
					5	1	0.5	0.25
W. B.	21	Onset of dermatitis on wrists after 10 days' exposure. Became generalized. Chills and fever. Hospitalized 9 days. Duration 1 month. Did not return to former exposure.	++++	++++	+++	++	++	+
P. L.	24	Onset on arms after 10 days' exposure. Became generalized. Had chills and fever. Hypersensitive to poison ivy.	++++	++++	+++	++	+	+
W. W.	23	Onset on wrists after 9 days' exposure. Spread up arms and back. Returned to work after 10 days. No recurrence.	+++	++++	+	–	–	–
V. Y.	26	Onset on wrists after 10 days. Became generalized. Did not return to former exposure.	+++	+++	–	–	–	–
J. H.	29	Onset on arms after 15 days. Duration 2 days. Returned to exposure without recurrence.	–	+++	–	–	–	–
H. B.	-----	Onset on wrists after 9 days' exposure Healed in 3 days. Did not return to former exposure.	–	++	–	–	–	–
CONTROLS								
W. S.	22	Worked 6 weeks. Immune	–	++	–	–	–	–
L. W.	42	Worked several months. Immune	–	–	–	–	–	–
R. R.	33	Worked 5 months. Immune	–	–	–	–	–	–

The two cases showing reactions at this time to all the patches, and the worker who was not seen, V. Y., had previously had generalized cases of severe dermatitis.

TABLE 2.—*Reactions to patch tests after 96 hours*

Patient	Patch test					
	1	2	3	4	5	6
W. B.	++++	++++	++++	+++	+++	++
P. L.	++++	++++	+++	+	+	+
W. W.	++++	++++	+++	–	–	–
V. Y.[1]						
J. H.	++	+++	–	–	–	–
H. B.	++	+++	–	–	–	–
CONTROLS						
W. S.	+++	+++	–	–	–	–
L. W.	+++	++++	–	–	–	–
R. R.	+++	++++	–	–	–	–

[1] Was not seen but reported that there were reactions under all patches.

The results of the patch tests show that those individuals who had had the most severe cases of dermatitis gave the strongest reactions to the patch tests. It is also seen that the controls reacted strongly to patches 1 and 2, but did not react to the weaker dilutions which produced reactions in the workers who had previously had severe cases of dermatitis. These facts indicate that the chemical is a primary skin irritant, and that it is also a sensitizer, as shown by the facts that there was a definite period of incubation of about 10 days after the first exposure before the dermatitis developed and that those cases who had become sensitized and who developed dermatitis reacted even to a solution of 0.25 percent of the chemical. Since the controls did not react to a 5 percent dilution in white mineral oil (patch 3), such a patch may be applied safely in order to discover hypersensitivity to the chemical.

An investigation was made of the occurrence of dermatitis in the two insecticide spray manufacturing plants which had purchased alpha naphthyl isothiocyanate to replace some of the pyrethrum used in their product.

In one of these plants, 13 employees out of a total of 58 who had possible contact with the new insecticide spray developed dermatitis.

For a number of years this company had been manufacturing an insecticide containing the insecticidal principles of 14 percent pyrethrum flowers and 1 percent ground derris root (prepared from derris mellicantus, a product imported from the East Indies, the insecticidal principles of which are said to be rotenone and deguelin), in deodorized kerosene. (Deodorized kerosene is made by repeated sulfonation of kerosene until the odor has disappeared.) During this period seven mild cases of dermatitis had occurred among the employees, all of whom had recovered while working and had apparently developed an immunity.

Seven days after this company changed its formula to consist of 7 percent pyrethrum flowers, 1 percent powdered derris, 1½ percent insecticide L.[2], and ¼ percent alpha naphthyl isothiocyanate, dissolved in a base of deodorized kerosene, dermatitis broke out among the workers. Six women of thirty who were engaged in filling cans with the insecticide, and 3 men of 12 who were filling cans were affected. Three men out of ten who were blending the chemicals to make the insecticide spray and one mechanic who came in contact with the insecticide while preparing the vats containing it were also affected. The 13 cases included 7 who had previously contracted mild dermatitis from the old formula containing only the insecticidal principles of pyrethrum flowers and derris root but who had recovered and apparently developed an immunity. None of the 13 persons had severe

[2] Insecticide L. contains about 12½ percent of butyl carbitol thiocyanate, 37½ percent of beta thiocyanoethyl laurate, and 50 percent deodorized kerosene.

enough cases of dermatitis to cause loss of time from work. The mild cases consisted of a simple erythema of the wrists and forearms lasting a few days and the more severe cases had papules and vesicles lasting as long as 6 weeks.

The formula of the insecticide was then changed to contain 7 percent pyrethrum flowers, 1 percent derris, and 2 percent of insecticide L. in deodorized kerosene. All the cases of dermatitis recovered and no new cases have occurred since.

In this factory patch tests were performed on a number of workers who did not develop dermatitis from the new blend of insecticide. The following is an excerpt from the report on these patch tests:

> Although no patch tests were done on any of the employees who developed dermatitis, tests were run on normal individuals with alpha naphthyl isothiocyanate and with insecticide L., as well as with a sample of the finished insecticidal spray containing both substances. Three persons were patch tested with a 10 percent solution of alpha naphthyl isothiocyanate in white mineral oil. In one case a rash was produced after 12 hours, in another case after 30 hours, and in the third case there was no effect.
>
> Two cases were tested with a 10 percent solution of insecticide L. in white mineral oil. In one case there was no reaction in 1 hour and in another case a barely visible area of redness after 30 hours. A sample of the insecticidal spray containing both substances was patch tested on three normal individuals. In one case a slight redness developed after 2 hours, in the second case only after 6 hours, and in the third case there was no reaction after 6 hours.
>
> The commercial alpha naphthyl isothiocyanate powder was placed on three normal individuals and one showed no reaction in 1 hour, but the other two showed marked reactions after 24 hours.
>
> Finally, the undiluted insecticide L. was tried on three normal individuals, one of whom showed no reaction after 1 hour, the other showed no reaction after 6 hours, and the third showed a barely visible reaction after 43 hours.
>
> On the basis of these findings it was concluded that the dermatitis was due entirely to alpha naphthyl isothiocyanate, and arrangements were made to discontinue the use of the substance. Since then no other cases of dermatitis have developed.

The second company manufacturing an insecticidal spray had no cases of dermatitis while blending a mixture of 7 percent pyrethrum extract and ½ percent of insecticide L. in deodorized kerosene. About 1 week after the formula was changed to a blend consisting of 5 percent pyrethrum extract, 1 percent of insecticide L., and ½ percent of alpha naphthyl isothiocyanate, in deodorized kerosene, dermatitis broke out, affecting 8 employees out of a total of 13. The dermatitis consisted of erythema, papules, and vesicles beginning on the wrists and forearms. Some of the cases were mild and some more severe. In one patient the dermatitis became generalized; he developed a temperature and albuminuria, and was confined to bed. He was away from work for 2 months, but entirely well at the time of the investigation. After this company discontinued the new formula

and returned to the old one, the cases of dermatitis recovered and no new cases have since developed.

A visit was made to the factory manufacturing insecticide L., and it was found that this preparation contained butyl carbitol thiocyanate, beta thiocyanoethyl laurate, and some impurities consisting mainly of dibutoxy diethyl ether in a base of deodorized kerosene.

Butyl carbitol thiocyanate is made by allowing butanol to react with dichlor diethyl ether and sodium hydroxide, forming carbitol chloride, which is added to sodium thiocyanate to form butyl carbitol thiocyanate, sodium chloride, and dibutoxy diethyl ether. The product is then treated with water to remove the salt and other impurities and is passed through activated carbon to remove odors.

Beta thiocyanoethyl laurate is made by treating lauric acid (obtained from coconut oil) with phosphorous trichloride to form lauryl chloride. This is converted into the chlorester of lauric acid, which is then washed and dried and treated with sodium thiocyanate.

The processes are all enclosed except the filtration to remove sludge.

The finished product sold for commercial purposes contains about 50 percent of these insecticides in 50 percent deodorized kerosene. The product also contains some impurities, chiefly dibutoxy diethyl ether. Both the insecticides are liquids and the finished product in deodorized kerosene is a red liquid.

The superintendent of the factory stated that skin tests had been performed with this product and that one out of 30 persons coming in contact with the insecticide showed a skin reaction. He also stated that at one time a chemist who was hypersensitive to the product had worked in the plant, but that there were no cases of dermatitis among the workers employed in the manufacturing process.[3]

DISCUSSION

While this investigation shows that alpha naphthyl isothiocyanate is a primary skin irritant and a sensitizer, it is not recommended that its manufacture be permanently discontinued, because nearly all insecticides are skin irritants or sensitizers, and when workers come in contact with new insecticidal preparations they are likely to develop

[3] Patch tests were performed on 9 volunteer workers who had never had dermatitis, employed in manufacturing insecticide L, with the following constituents of insecticide L:

Patch test No. 1.—50 percent butyl carbitol thiocyanate in deodorized kerosene.

Patch test No. 2.—37½ percent beta thiocyanoethyl laurate plus 12 percent of butyl carbitol thiocyanate in deodorized kerosene.

Patch test No. 3.—5 percent of patch test No. 2 in white mineral oil.

Patch test No. 4.—1 percent of patch test No. 2 in white mineral oil.

Patch test No. 5.—½ percent of patch test No. 2 in white mineral oil.

Patch test No. 6.—¼ percent of patch test No. 2 in white mineral oil.

All 9 patch test subjects reacted to patch test No. 1. One subject reacted to both patch test No. 1 and patch test No. 2. There were no reactions to any of the other patch tests.

It is of interest to note that while undiluted ordinary kerosene, when applied as a patch test for 24 hours will cause a reaction on normal skin, the deodorized kerosene (deodorized by repeated sulfonation) used as a solvent for these insecticides did not cause such a reaction.

dermatitis. It is the general experience that they can be safely manufactured under proper working conditions. However, before this new insecticide is placed on the market for use in insecticidal sprays, actual experiments should be performed as to its effect on the skin of those who may be exposed to its action when it is sprayed, according to directions, in an enclosed room to destroy insects. Such tests can be made by spraying the insecticide containing alpha naphthyl isothiocyanate in a closed room in which a group of persons are exposed to its action for 15 minutes a day for at least 10 days, and then observing them for 10 days more. If one case of dermatitis should develop among 200 persons thus exposed, the product should not be placed on the market.

If, as a result of such an experiment, it is decided to continue the manufacture of alpha naphthyl isothiocyanate, it is recommended that the manufacturing process be totally enclosed. That is, the open filter should be replaced by a closed one and the wet material should be transferred by an enclosed belt to a totally enclosed drying chamber and removed from it in the same manner to a totally enclosed grinder, or some other enclosed method of handling should be devised. The workers should be furnished and compelled to wear protective clothing such as rubber gloves, rubber boots, and aprons, and clean work clothes should be furnished them daily by the management. Adequate shower baths should also be installed and the workers should be compelled to use them before leaving the factory. In addition to this the following directions should be placed on containers of the product before it is sold to the insecticide spray manufacturers:

This chemical is irritating to the skin and toxic; therefore the solid material or its solutions should not be allowed to come in contact with the skin, to be inhaled, or to be otherwise taken into the system. It should be handled in the following manner in its manufacture or when blending it into an insecticide mixture:

Do not inhale the dust, wear a respirator.

Do not expose the eyes, wear goggles.

Do not expose any part of the body to the solid or to the solutions, wear protective garments.

Do not employ individuals who have skin eruptions to handle this chemical.

Do not employ individuals who have any abrasions or burns or chapping of the skin until such injuries have healed.

Keep clean the skin of those who handle the chemical.

Use mechanical means wherever possible for handling the solid chemical or its solutions.

CONCLUSIONS

Experiments on animals with most of the insecticides show that they are toxic and irritating to the skin, and in sufficient concentration are capable of producing death. The petroleum distillate which is usually used as a solvent for the insecticide is also toxic and, if not specially treated, is irritating to the skin. In spite of this, insecticide sprays containing these toxic substances are usually sold to the public

without any warning that their contents are injurious. They are usually sold in cans, the contents of which are to be poured into a spray gun furnished with the can. The directions on the can state that the insecticide is to be sprayed from the spray gun into the air of a closed room or on garments. The only hint as to the toxicity of the product is given by the statement usually found on the can that the sprays are harmless if used according to directions. The emphasis in such a statement is in direct contrast to the emphasis contained on poison labels of other poisons such as iodine, phenol, and the like, which are also harmless if used according to directions. The statement that the insecticides are harmless tends to make customers careless in their use. The directions on the cans should be worded in such a manner as to impress on the consumer the fact that the contents are toxic and irritating to the skin unless they are used according to directions. This would place the emphasis on their toxicity and tend to make people more careful in using them. Indeed, placing poison labels on all insecticides would better safeguard not only the health of the consumer but also the financial interests of the manufacturer by helping to protect him against law suits. The directions for use should state that in spraying these substances protective clothing should be worn, the face and other portions of the skin should be exposed as little as possible to their action, and that the containers should be kept away from articles of food and out of the reach of children.

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STUDIES ON THE STANDARDIZATION OF GAS GANGRENE ANTITOXIN (*SORDELLII*)

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Although *Clostridium sordellii* is not regarded as widely distributed in nature and infections in humans and animals have been infrequently reported, it no doubt has a sufficiently important role in gas gangrene to justify the standardization of its antitoxin.

Clostridium sordellii was first isolated by Sordelli in 1922 (*1*). He recovered it from 2 out of 11 cases of acute edematous wound infections in Buenos Aires (*2*, *3*, *4*). As this organism was found to possess the putrefactive properties of *Cl. sporogenes* and pathogenic properties similar to *Cl. oedematiens* (*Cl. novyi*), Sordelli named it *Bacillus*

oedematis sporogenes. In 1927 Hall and Scott (*5*) suggested the name *B. sordellii* to replace the trinomial. That same year Meleney, Humphreys, and Carp (*6*, *7*), in New York, isolated this organism from 2 cases of post-operative infections due to contaminated catgut. Believing it to be a new species they named it *Cl. oedematoides*. Later it was shown to be the same as *Cl. sordellii* (*8*, *9*). In 1931, Hall and Gray (*10*) recovered *Cl. sordellii* from a case of septic peritonitis in Denver. It has also been recovered in this country from cases of icterohemoglobinuria in cattle. Only 2 cases have been reported from Europe (*11*).

The similarity and possible identity (*12*, *13*) of *Cl. sordellii* to *Cl. bifermentans*,[1] first isolated by Tissier and Martelly in 1902 (*14*), increases the importance of these organisms in gaseous gangrene. *Cl. bifermentans* is quite commonly found in wound infections but has not been considered of great significance. Weinberg et al. (*11*) have found it to be of greater frequency in wound infections than *Cl. histolyticum*. The *bifermentans* strains isolated from wounds have been described as nonpathogenic, but since a nonpathogenic variant of *Cl. sordellii* has been described (*5*) it would be difficult, if not impossible, to differentiate the two. The importance of the apparently nontoxin-producing strains in mixed wound infections is a question that calls for investigation.

The standardization of *sordellii* antitoxin was conducted in a manner similar to that employed in standardizing the other gas gangrene antitoxins. Dried toxin and antitoxin to be used as standards were prepared. With the purpose of establishing a unit of measurement which may be considered for international adoption, comparative tests were made with the provisional unit of the Argentine Republic (*16*).

PREPARATION OF THE *SORDELLII* TOXIN

A 1-percent Witte peptone meat infusion broth with a pH of 7.6 distributed in 2-liter Erlenmyer flasks was used for cultivating the organism. The culture used was labeled *Cl. sordellii XR* and was received from Hilda Hempl Heller. This strain was chosen after a comparative study of the toxin production of 8 different cultures

[1] In 1936, while making a study of the proteolytic anaerobic bacteria, Clark and Hall (*12*) noted the close similarity of *Clostridium bifermentans* to *Clostridium sordellii*. They found that these two organisms could not be differentiated in morphology, colony formation, biochemical reactions, or serologically, but only by toxin production. They also found that *bifermentans* antisera would neutralize to a certain extent highly toxic *Cl. sordellii* strains. They did not recommend that the two species be grouped together because of difference in pathogenicity. Stewart (*13*), in 1938, confirmed their work and proposed that the two be consolidated under the name of *Cl. bifermentans* which has priority over *Cl. sordellii*. Since then the question has arisen (*15*) as to the possible identity of *Cl. sordellii* with Koch's "*oedematis maligni*," thus increasing the complexity of the relationship of the proteolytic anaerobes. For this reason the name *Cl. sordellii* is retained awaiting further study of the problem.

labeled *Cl. sordellii*. These varied in toxicity from a nontoxin-producing strain to this highly pathogenic strain. Each flask of broth was inoculated with a 24-hour meat culture, then incubated at 37.5° C. for 20 hours. The growth was filtered through sterile filter paper pulp, then through Mandler filters. The filtered toxin had a minimal lethal dose of 0.0001 cc. for a 17- to 20-gram mouse when inoculated intravenously. The toxin was precipitated with ammonium sulfate, transferred to a Buchner funnel containing filter paper to remove as much of the fluid as possible, and then dried over phosphorus pentoxide. The yield of toxin from 60 liters of filtrate was 446 grams.

The minimum lethal dose of the dried toxin was found to be from 0.001 mg. to 0.002 mg. when inoculated intravenously into a 17- to 20-gram mouse.

DETERMINATION OF THE "TEST DOSE" OF TOXIN

The test dose of this toxin was determined by testing against a glycerinated antitoxin received from Dr. Alfredo Sordelli of the Argentine Republic. This antitoxin contained 5 units per cc. as determined by subcutaneous inoculations in guinea pigs (*16*).

In determining the "test dose" of the toxin the glycerinated antitoxin received from the Argentine Republic was diluted with 0.85 percent saline so that 1 cc. contained 1 unit. The toxin was diluted so that 1 cc. contained 2 mg. of toxin. The toxin was used in amounts varying from 0.11 cc. (0.22 mg.) to 0.22 cc. (0.44 mg.) with 0.2 cc. of the antitoxin dilution or 0.2 unit plus sufficient saline to equal 0.5 cc. The mixtures were kept at room temperature for one hour, following which they were injected intravenously in 17- to 20-gram mice. The animals were kept under observation for 4 days.

Results of the "test dose" determination of the United States toxin with the Argentine Republic antitoxin are given in table 1.

TABLE 1.—*Preliminary test for determination of the "test dose" of toxin; antitoxin constant, toxin varied*

Toxin (mg.)	Antitoxin	Number of mice used	Mice surviving	
			Number	Proportion
0.22	0.2	3	3	3/3
0.26	0.2	3	3	3/3
0.30	0.2	3	3	3/3
0.34	0.2	3	3	3/3
0.38	0.2	3	1	1/3
0.42	0.2	3	0	0/3
0.44	0.2	3	0	0/3

The results indicated that the "test dose" was approximately 0.38 mg. when tested against 0.2 unit of antitoxin. The test was repeated using six mice to the dose. The results are given in table 2.

TABLE 2.—*Determination of the "test dose" of toxin; antitoxin constant, toxin varied*

Toxin (mg.)	Antitoxin	Number of mice used	Mice surviving	
			Number	Proportion
0.36	0.2	6	6	6/6
0.38	0.2	6	2	2/6
0.40	0.2	6	0	0/6

The "test dose" of the toxin (0.38 mg.) was then tested against varying amounts of the Argentine antitoxin, 10 percent above and 10 percent below the 0.2 unit. The following results were obtained, confirming 0.38 mg. as the "test dose" of toxin.

TABLE 3.—*Determination of the "test dose" of toxin; toxin constant, antitoxin varied*

Antitoxin (units)	Toxin	Number of mice used	Mice surviving	
			Number	Proportion
	Mg.			
0.18	0.38	6	0	0/6
0.2	0.38	6	4	4/6
0.22	0.38	6	6	6/6

TESTS ON THE UNITED STATES STANDARD ANTITOXIN

The *sordellii* serum was obtained from a commercial manufacturing firm. It was measured accurately in 10 cc. amounts into chemically free resistance glass ampules. These were thoroughly dried over phosphorus pentoxide.

The weights of the dried residue contained in 10 ampules were determined and the mean weight found to be 0.9669 g.

The dried residue of one of the ampules was dissolved in 10 cc. of 0.85 percent salt solution and then made up to 100 cc. with 66 percent glycerine. From this dilutions were made up to 1/2000 for preliminary tests.

TABLE 4.—*Assay of the United States standard antitoxin against 0.38 mg. of toxin. Preliminary test*

Dilution of antitoxin	Amount of dilution	Number of mice used	Mice surviving	
			Number	Proportion
	(cc.)			
1/100	0.2	3	3	3/3
1/500	0.2	3	3	3/3
1/1000	0.2	3	3	3/3
1/1500	0.2	3	0	0/3
1/2000	0.2	3	0	0/3

Dilutions were then made between 1/1000 and 1/1500.

TABLE 5.—*Assay of the United States standard antitoxin against 0.38 mg. of toxin. Second test*

Dilution of antitoxin	Amount of dilution	Number of mice used	Mice surviving	
			Number	Proportion
	(cc.)			
1/1100	0.2	3	3	3/3
1/1200	0.2	3	3	3/3
1/1300	0.2	3	3	3/3
1/1400	0.2	3	3	3/3
1/1500	0.2	3	0	0/3

From the results obtained it was assumed that 0.2 cc. of a 1/1450 dilution of the United States standard antitoxin was equivalent to 0.2 unit. Varying amounts of a 1/1450 dilution were then tested against the "test dose" of toxin, or 0.38 mg.

TABLE 6.—*Assay of the United States standard antitoxin against 0.38 mg. of toxin. Third test*

Antitoxin dilution	Amount of antitoxin	Number of mice used	Mice surviving	
			Number	Proportion
	(cc.)			
1/1450	0.18	6	0	0/6
1/1450	0.2	6	3	3/6
1/1450	0.22	6	6	6/6

The 1/1450 dilution of the United States standard antitoxin was then tested against varying amounts of the toxin using approximately 10 percent above and 10 percent below the determined "test dose" of 0.38 mg.

TABLE 7.—*Assay of the United States standard antitoxin against varying amounts of toxin; antitoxin constant*

Amount of 1/1450 antitoxin dilution	Units of antitoxin	Toxin	Number of mice used	Mice surviving	
				Number	Proportion
Cc.		*Mg.*			
0.2	0.2	0.34	6	5	6/6
0.2	0.2	0.38	6	3	3/6
0.2	0.2	0.42	6	0	0/6

The standard antitoxin was diluted so that 1 cc. of a 1/72.5 dilution of the glycerinated antitoxin contained 20 units; this, when further diluted 1/20 with saline, will contain 1 unit, since 1 cc. of the undiluted antitoxin contains 1,450 units (1/72.5×1/20 equals 1/1,450).

On the basis of the mean weight of the dried residue of 10 cc. of the standard antitoxin (0.9669 g.) this amount contains 14,500 units and one unit is contained in 0.06668 mg. of standard antitoxin.

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POTENCY OF COMMERCIAL ANTITOXINS TESTED

Several commercial antitoxins were available for testing. These were tested against the "test dose" with the following results:

1. 800 units per cubic centimeter.
2. 800 units per cubic centimeter.
3. 1,700 units per cubic centimeter.
4. 1,450 units per cubic centimeter.

THE PROVISIONAL UNIT

On the basis of the tests performed, the unit proposed by Sordelli may be accepted as the provisional unit for the present pending international acceptance of this unit or a multiple of it.

DETERIORATION OF *SORDELLII* TOXIN

Tests were made to determine the effect of light and temperature on the toxin. Specimens of the dried toxin were placed in dry, stoppered bottles and exposed to the following conditions:

Ten degrees C. in vacuum jar for 12 months; sunlight outside window for 102 days; room temperature in the dark for 102 days; warm room (37.5° C.) in the dark for 102 days. Toxin was also exposed to the air in a desiccator at 10° C. for 12 months. The specimens were then tested for deterioration by determining the "test dose" and the minimum lethal dose of each. The following results were obtained:

	Minimum lethal dose (mg.)	*Test dose (mg.)*
10° C. in vacuum jar	0. 001–0. 002	0. 38
Sunlight outside window	. 004	. 38
Room temperature in the dark	. 002	. 38
Warm room (37.5° C.)	. 008	. 76
Exposed to air in desiccator at 10° C	. 004– . 006	. 60

The results indicate that dry *sordellii* toxin is relatively stable at a low temperature in the absence of oxygen, but unstable at high temperatures and when exposed to oxygen.

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THE INFLUENCE OF DIET ON THE CHRONIC TOXICITY OF SELENIUM

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Throughout the whole course of investigations in this laboratory on the chronic toxicity of selenium there has been one characteristic that has stood out prominently, namely, the great variation in individual as well as in species susceptibility. Thus, when rats received in their diet 10 to 15 parts per million of selenium as sodium selenite or selenate, some of the animals would die relatively early with more or less extensive pathological changes in the tissues and organs, while a considerable percentage would often survive indefinitely and show scarcely any effects (*1*). More recently, while investigations were being made with naturally occurring food selenium in rats, rabbits, and cats, similar variations in individual susceptibility were noted, although in this series of experiments differences in species susceptibility were most pronounced (*2*). Under the conditions of the above experiments, the toxicity and pathologic effects of this type of selenium appeared to be most uniform and most pronounced in rats and least pronounced in cats, though the earlier work (*1*) had indicated a much higher susceptibility to selenium in the rabbit and cat as compared with the rat. Analysis of the various factors involved in the discrepancies made it appear probable that dietary factors might in some way determine the toxicity of selenium.

In an attempt to answer this question, the present experiments were all made upon the Wistar strain of albino rats of inbred stock

maintained on a diet of Purina dog chow. The animals were placed on the experimental rations at the age of about 30 to 35 days when they usually weighed from 50 to 60 grams. Animals of each sex were kept in groups of 5 or 6 in metal cages provided with raised wire-mesh bottoms and clean running tap water. Records were kept of the weights of the animals and their average food consumption, from which the average daily selenium intake per kilogram of body weight was computed.

TABLE 1.—*Composition of experimental diets*

Diet number	25	27	28	29	30
Seleniferous whole wheat flour, 20 p. p. m. selenium, 2.31 percent N	50	50	50	0	0
Control whole wheat flour, no selenium, 2.10 percent N	0	0	0	50	50
Commercial casein	0	0	20	0	0
Dried brewer's yeast, 9.22 percent N	5	5	5	5	5
McCollum's salt mixture No. 185	4	4	4	4	4
Cod-liver oil	2	2	2	2	2
Olive oil	8	0	8	0	8
Beef fat	0	39	0	39	0
Corn starch	31	0	11	0	31

The composition of the experimental diets is shown in table 1. Diets 25, 27, and 28 contained 10 parts per million of naturally occurring food selenium. The seleniferous whole wheat flour which was used to the extent of 50 percent in these diets was from a supply of wheat containing 20 parts per million of selenium, grown in Gregory County, South Dakota. Its nitrogen content was 2.31 percent. The control diets 29 and 30 contained an equivalent amount of a commercial selenium-free whole wheat flour having a nitrogen content of 2.10 percent. The seleniferous diet No. 25 thus consisted, like the control diet No. 30, of about 10 percent protein, 10 percent fat, and about 75 percent carbohydrate. The seleniferous diet No. 27, like the control diet No. 29, consisted of about 10 percent protein, 41 percent fat, and about 43 percent carbohydrate, the last derived chiefly from the wheat flour. The high-protein seleniferous diet No. 28 consisted of about 30 percent protein, 10 percent fat, and about 55 percent carbohydrate. The caloric distribution in the seleniferous diets was about as follows: In diet 25 about 9 percent of the total calories was derived from protein, 20 percent from fat, and over 70 percent from carbohydrate. In the high-protein diet 28 about 28 percent of the food energy was derived from protein, 20 percent from fat, and about 52 percent from carbohydrate. In the high-fat diet 27 only 30 percent of the food energy was derived from carbohydrate, 7 percent from protein, and 63 percent from fat. The caloric values of diets 25, 28, and 30 were about the same, while the caloric value of the high-fat diets 27 and 29 was about 36 percent higher. It might be supposed from this that the food consumption of the animals on

diet 27, and consequently the selenium intake, would be lower than in the animals on diets 25 and 28. Actual check-up of the food and selenium intake per kilogram of body weight showed that it was about the same in the three groups, viz, from about 0.8 to 1.0 mg. of selenium per kilogram per day.

The experiment ran over a period of 4 months. The results are described in the following paragraphs.

Diet 25.—Twenty-two rats, 7 males and 15 females, weighing 50 to 65 grams, were used in this experiment. The first death occurred in 20 days. At the completion of the experiment 17 animals, 77 percent, had died. With the exception of 2 animals dying at an early date, all the animals, including the 5 survivors, had advanced atrophic nodular cirrhosis of the liver. Of 8 animals surviving 90 days, 5 had anemia with hemoglobin levels of 7 to 9 grams and reticulocyte counts of from 5 to 25 percent. Most of the animals dying at an earlier date had severe anemia as shown by blood smears, the precise extent of which was, however, not determined. Ascites, usually straw colored and at times also bloody, varying in amounts from about 2 to 20 cc., was seen in more than 50 percent of the animals dying within the experimental period of 120 days. In a few there was also some effusion in the pleura and pericardium. Loss of hair was also seen in a few of the animals, though this was relatively inconspicuous in this group. Analysis of the livers for selenium in a group of 6 rats at 100 to 120 days gave a range of from 1,430 to 2,860 micrograms per 100 grams wet weight.

The average weight curves of the animals of this group and the mortality rate are shown in chart 1. Figure 1 is a photograph of a typical rat in this group taken 95 days after the beginning of the experiment. The ascites in this animal was very pronounced. The characteristic atrophic and nodular appearance of the livers of the animals of this group is shown in figure 2. The nodular liver, No. 25, was taken from a rat weighing 125 grams, 120 days after the experiment was begun.

Diet 27.—In this group there were 21 rats, 9 males and 12 females, weighing 50 to 68 grams. Growth was decidedly subnormal in the whole group as shown by the average weight curve in chart 1. However, all but 3 survived the experimental period of 120 days, and the general appearance of these animals was healthy. They were active and, except for the extensive loss of hair and stunted growth, they looked quite normal. The most uniform and most pronounced manifestation in this series of animals was a general scantiness of hair with areas of alopecia varying in size and location. The loss of hair was preceded by a peculiar greased appearance of the animals which set in within 2 to 4 weeks on the diet. In several instances the loss of hair was so extensive that the animals were literally hairless. It is

believed that the several deaths in this group were partly due to this condition which resulted in excessive loss of body heat. Hematological studies failed to reveal any marked abnormalities. Blood films were uniformly negative, reticulocyte counts were within the normal range of from 0.5 to 2.0 percent, and the hemoglobin levels varied usually from about 13 to 15 grams. In 3 of the animals the hemoglobin levels were relatively low, 10 to 12 grams, but this is believed to have been due to their general poor nutritive condition rather than to the toxic effects of selenium.

At necropsy there was neither cirrhosis of the liver nor effusions. The spleens were not enlarged and, indeed, none of the organs or vis-

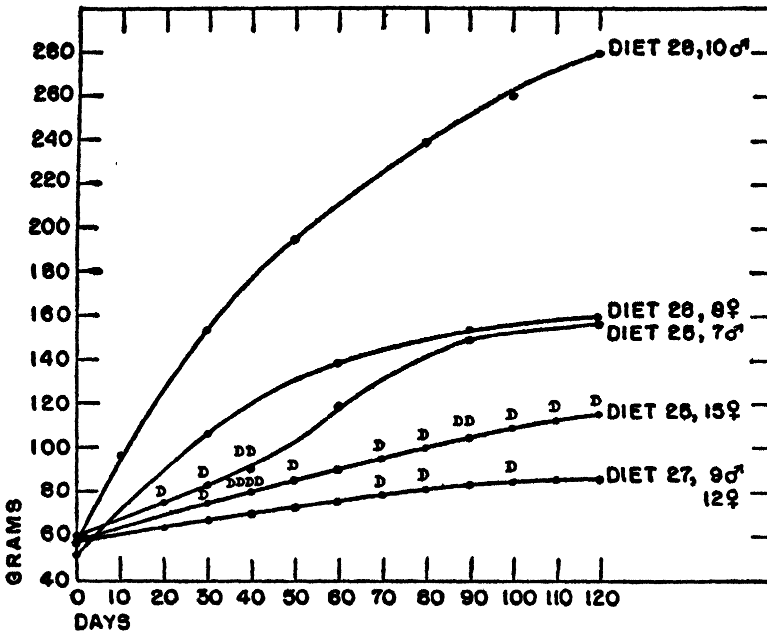

CHART 1.—Average weight curves of rats on low protein-high carbohydrate diet 25, low protein-high fat diet 27, and high protein-low carbohydrate diet 28. *D* indicates death of an animal. All diets contained 10 parts per million of selenium in the form in which it occurs naturally in wheat.

cera showed any gross abnormalities except for their small size in relation to the age of the animal. Microscopic examination of the tissues by Dr. R. D. Lillie of the Division of Pathology disclosed only midzonal fatty degeneration in the liver with many mitotic figures in the polygonal liver cells. This and other features of the pathology of chronic selenium poisoning will be described in detail elsewhere.

Analysis of the livers for selenium in a series of 7 rats of this group at 110 to 120 days revealed a range of from 1,000 to 2,400 micrograms per 100 grams of wet weight.

A typical illustration of the appearance of the animals in this group is shown in figure 3. This photograph was taken 80 days after the

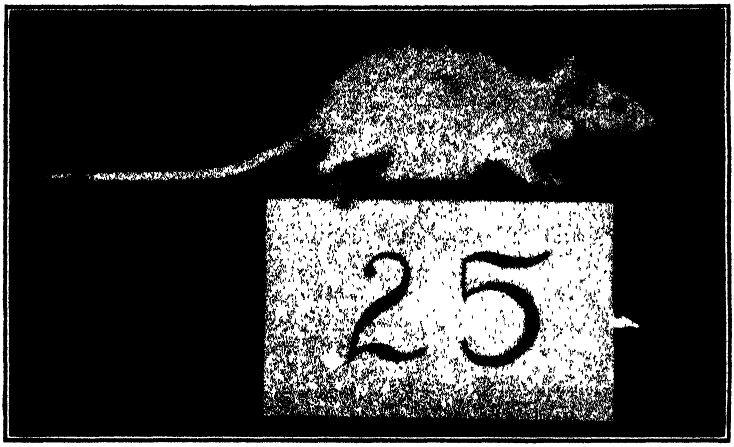

FIGURE 1.—A typical rat receiving 10 parts per million of selenium in a diet of low protein and high carbohydrate content. The animal was photographed 95 days after the beginning of the experiment. It was markedly anemic, had advanced nodular cirrhosis, and the ascites is evident. Weight was 100 grams.

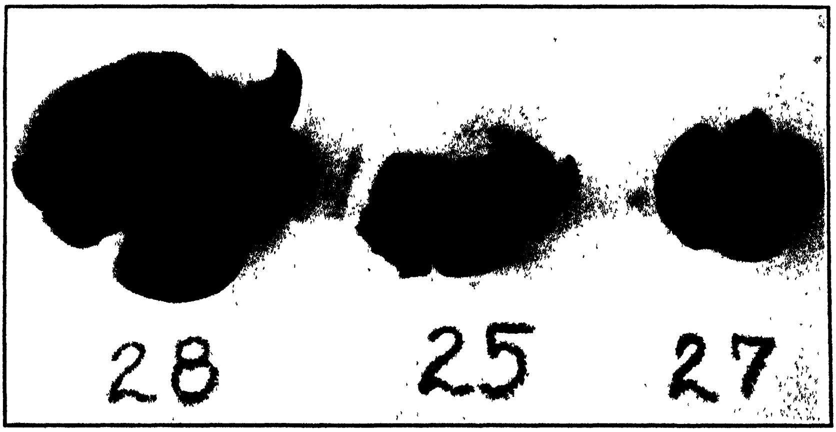

FIGURE 2.—Livers of rats on the 3 experimental diets containing 10 parts per million of selenium as it occurs naturally in wheat. Number 25 is the nodular cirrhotic liver of the rat shown in figure 1, on death of the animal 120 days after the experiment was begun. The rat weighed 125 grams, and had about 25 cc. of clear straw-colored ascitic fluid. Number 27 is the liver of the rat shown in figure 3, which was kept on a low protein-high fat diet. The animal was killed after 120 days on the diet. It weighed 60 grams, and was literally hairless. Number 28 is the liver of a male rat, shown in figure 4, kept on a high protein-low carbohydrate diet. After 60 days on the diet the animal weighed 240 grams, and the liver 9.2 grams. Microscopically, liver 25 showed nodular cirrhosis, liver 27 some midzonal fatty degeneration of the polygonal cells, while liver 28 showed no structural changes.

FIGURE 3.—A typical rat on the seleniferous low protein-high fat diet 27. Note the stunted growth and alopecia. The photograph was taken after 80 days on the diet, when the animal weighed 60 grams.

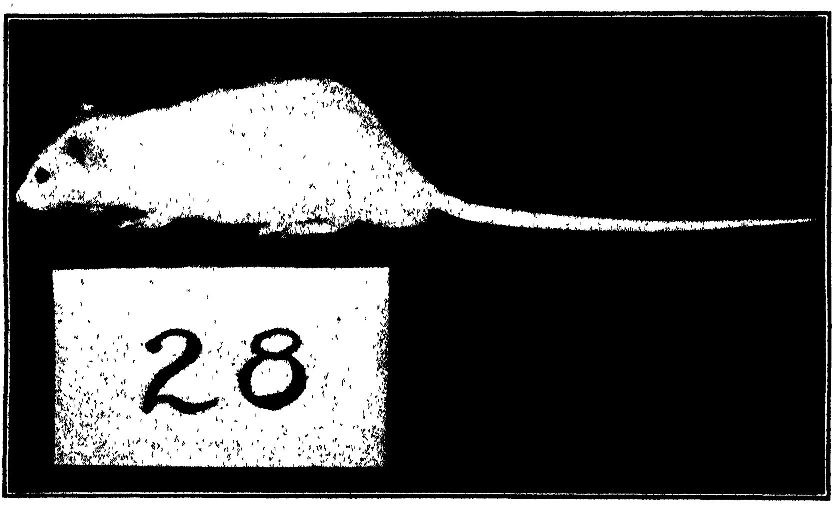

FIGURE 4.—A typical rat on the seleniferous high protein-low carbohydrate diet 28. The photograph was taken 30 days after the beginning of the experiment.

beginning of the experiment. The alopecia, though not as pronounced as in some of the other animals in this group, is sufficiently obvious. The stunted growth of the animal is marked; it weighed only 60 grams. The normal appearance of the liver of this animal at 120 days is shown in figure 2, while the selenium content of this particular liver was 2,140 micrograms percent.

The stunted growth of the animals on diet 27 must be ascribed, in part at least, to the unbalanced nature of the diet rather than to the toxic effects of the selenium. This appears probable for two reasons: First, animals on the control low protein-high fat diet No. 29

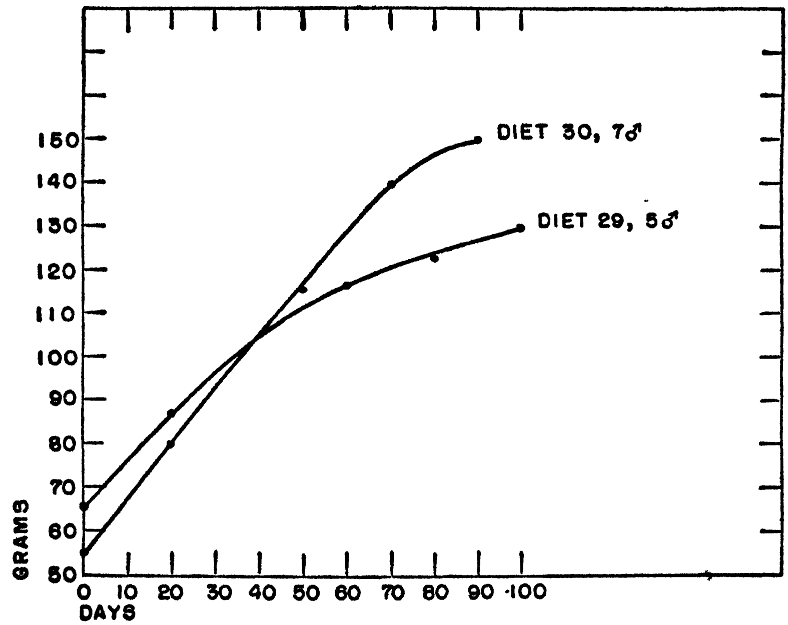

CHART 2.—Average weight curves of rats on control non-seleniferous low protein-high carbohydrate diet 30 and low protein-high fat diet 29.

also showed decidedly subnormal growth, as shown by the average weight curve for 5 males in chart 2. The hemoglobin levels in this control group of animals were also somewhat below normal, the range being from 12.0 to 15.2 grams. It should be added that in appearance these control animals were entirely normal, there being not the slightest suggestion of any disturbance in the skin or appendages, or in any of the internal organs at necropsy.[1] Second, when hairless and stunted animals were taken off diet 27 and placed on a selenium-free semisynthetic adequate diet (No. 242) consisting of 18 percent casein, 5 percent dried brewers' yeast, 4 percent salt mixture No. 185,

[1] Microscopic examination of the livers of these animals showed some midzonal fatty degeneration not unlike that seen with diet 27.

2 percent cod-liver oil, 8 percent olive oil, and 63 percent corn starch, normal growth was promptly resumed, as shown in chart 3. Resumption of hair growth also occurred within 10 days, and by the end of a month the animals appeared entirely normal. Moreover, one of the animals in this group, No. 21 (chart 3), was changed at 120 days to the seleniferous but otherwise adequate high protein diet 28, the composition of which is shown in table 1, and in this animal also normal growth was resumed, and by the end of the experimental period it had a normal covering of hair. The hemoglobin levels of these animals

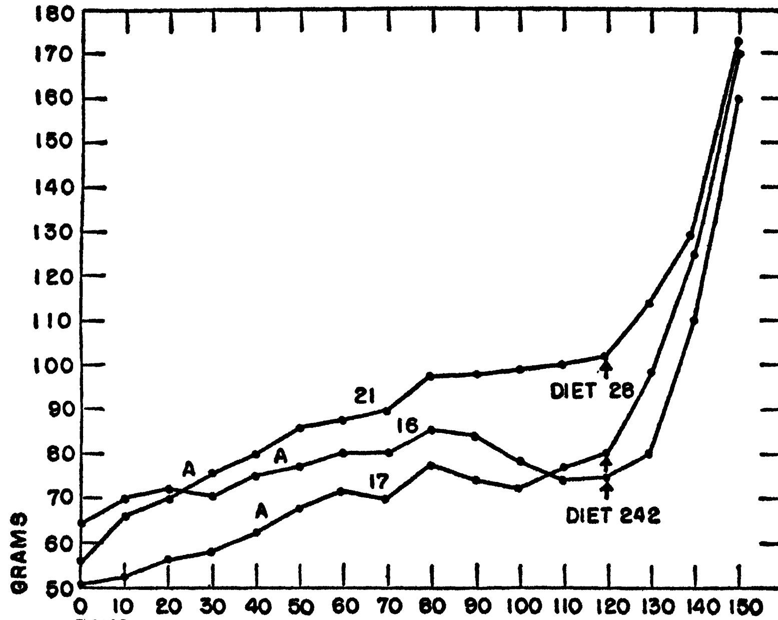

CHART 3.—Temporary and reversible nature of the effects of the seleniferous low protein-high fat diet 27 on stunted growth and alopecia. After 120 days on diet 27 rats 16 and 17 were changed to the balanced non-seleniferous semisynthetic diet 242, and rat 21 was changed to the seleniferous high protein-low carbohydrate diet 28. All rats resumed normal growth, acquired a new coat of hair, and at necropsy showed relatively little or no evidence of structural damage. *A* indicates the onset of alopecia.

rose during this 30-day period from 10.3, 13.2, and 13.1, to 12.2, 14.0, and 15.0 grams, respectively. At necropsy there was no evidence of effusions or any of the tissue damage which is so characteristic of selenium poisoning. The livers of rats 16 and 17 were normal, both in the gross and microscopically, while the liver of rat 21 showed only slight pitting of the surface and microscopically some lymphocyte infiltration of the portal areas, some periportal fibrosis, retraction of the capsule, and some nodular hyperplasia of liver cells.

Diet 28.—Twenty-five rats, 10 males and 15 females, weighing from 50 to 55 grams, were placed on diet 28, which contained 10 parts per million of selenium as it occurs naturally in wheat, and approximately

30 percent protein. Growth was unimpaired in these animals, as shown by the average weight curves given in chart 1 for the 10 males and 8 of the 15 females. Seven of the 15 females were not included in the chart because reproduction was studied in this group, as will be described below. Needless to say, there were no deaths among these animals. The hemoglobin levels for the males ranged from 14.7 to 18.5 grams, and for the females from 14.0 to 18.5 grams. At necropsy at the expiration of the experimental period there was no evidence of any tissue damage in any of the organs of the males, while in 6 of the 15 females there was slight to moderate pitting of the surface of the livers. Microscopically in these livers there was slight to moderate lymphocyte infiltration, slight to moderate proliferation of fibrous tissue in the portal areas, and some retraction of the liver capsule. It is perhaps significant that the livers of the females alone showed some degree of involvement, and relatively more in those that were permitted to reproduce. Ascites or any other abnormalities were not seen in any of the animals.

Figure 4 shows a typical rat in this group, 30 days after the experiment was begun. The animal continued to grow and at 60 days weighed 240 grams. The normal appearance of the liver of this animal, which weighed 9.2 grams, is shown in figure 2.

Analysis of a series of 11 livers from these animals for selenium at the expiration of the experimental period of 120 days showed a range of from 370 to 760 micrograms per 100 grams wet weight. This is decidedly lower than that found in the livers of animals on diets 25 and 27. The meaning of this is not clear at present. On the basis of food consumption, the daily intake per kilogram of body weight was about as high in this as in the other two groups.

Reproduction was studied in a series of 7 females and 3 males in this group. After a period of 2 months on the experimental diet the animals were permitted to mate. Six of the females bore litters of from 3 to 8 within 23 to 27 days. The seventh female bore a litter of 4 in 47 days. Of one litter of 8, 4 died within 24 hours; of another litter of 4, 1 died within 24 hours; and the entire litter of 6 of another animal died within 24 to 48 hours. The latter animal apparently failed to take any interest in her young and was found eating some of them. All the animals, 36 in all, were born alive and appeared entirely normal. The 25 surviving animals were reared normally, while the mothers were continued on the same seleniferous diet No. 28. At the age of 21 to 25 days they weighed 22 to 40 grams each. They were weaned at this time and continued on diet 28. Twelve died in from 2 to 25 days. At 27 days the surviving 13 animals, which had made fairly good growth in the meantime (60 to 90 grams), were killed. All the animals of this group, those that died as well as those that were sacrificed, showed the

typical effects of selenium poisoning, either anemia, ascites, or liver cirrhosis, or all three combined. This only confirms the earlier conclusion that susceptibility to selenium is much greater in very young animals (*2*), although the possibility of an inherited increased susceptibility cannot be excluded. This result is not inconsistent with the other evidence showing that high protein intake affords protection against chronic selenium poisoning. The significant fact is that reproduction was at all possible on a diet of 10 parts per million of selenium, and that the young were born alive and most of them reared normally.

Analysis for selenium of some of the fetuses of the two litters that died within 24 hours revealed a selenium content of 270 and 320 micrograms, respectively, per 100 grams wet weight. This confirms an earlier report from this laboratory on the transmissibility of selenium through the mammalian placenta (*3*), and further demonstrates that the extraordinary susceptibility of the developing chick embryo to selenium, as demonstrated by Franke and his associates (*4*), is not shared by the mammalian fetus.

DISCUSSION

These experiments demonstrate that the chronic ingestion of naturally occurring food selenium may have disastrous effects or may be relatively harmless depending on dietary factors. Ten parts per million of wheat selenium fed in a low protein-high carbohydrate diet caused atrophic nodular cirrhosis, ascites, pleural and pericardial effusions, blood destruction and anemia, and death. Loss of hair on such a diet is in evidence though not especially marked. The same amount of selenium fed in a low protein-high fat diet caused stunted growth and extensive loss of hair, but no effusions, no anemia, and no other structural changes except for some midzonal fatty degeneration of the liver cells. Those effects are not permanent, for when such animals are returned to a normal well-balanced ration body growth and hair growth are promptly resumed and the slight liver damage appears to be repaired. Lastly, the same amount of selenium fed in a high protein-low carbohydrate diet had no demonstrable effects on growth or reproduction, and no structural effects except for a relatively mild degree of chronic interstitial hepatitis in some of the more susceptible individuals. The mechanism for the protective action of these dietary factors against the toxic effects of selenium is not known. It may be assumed for the present that the protective action of the high-fat diet may be due to its protein sparing action. It may be that ultimately the explanation may be found in the differential action of selenium on enzymes concerned with metabolic processes. From the work of Labes and Krebs (*5*), Potter and Elvehjem (*6*), Stotz and Hastings (*7*), C. I. Wright (*8*), and others it is known that selenium

inhibits certain of the respiratory enzymes, more especially those concerned with dehydrogenation of intermediary carbohydrate metabolites. There is less certainty about the effects of selenium on fat and protein metabolism. Cathcart and Orr (*9*), studying the effects of a toxic dose of sodium selenite injected subcutaneously into dogs, found an increased urea and nitrogen output in the urine. In some unpublished experiments carried on by Dr. C. I. Wright in this laboratory it was found that liver arginase in rats was often increased by feeding either inorganic or naturally occurring food selenium. This affords some evidence that at least one enzyme concerned in protein metabolism is not only not inhibited but may be actually enhanced by selenium. It is perhaps significant that the seleniferous diet which was least damaging to the tissues furnished only 30 percent of its total food energy as carbohydrate.

On the assumption that sulfur might be related in some way to the toxicity of selenium, and in view of the fact that methionine is rather low in the wheat protein gliadin and relatively high in casein (*10*) an experiment was carried on to ascertain the effect of added methionine on the toxicity of selenium. A group of rats weighing about 50 grams each were placed on diet 25 into which dl-methionine was incorporated to the extent of 0.8 percent of the diet; that is, the methionine equivalent of 20 percent of casein in the diet was added. This experiment is still in progress, but the results already indicate quite definitely that methionine by itself is not the answer to this problem.

While more work will have to be done to elucidate the present findings, their practical significance is clear. They not only help to explain many of the discrepancies of our own earlier work as well as those of others published in the literature, but they shed much light on the selenium problem as it is related to livestock and human beings in the endemic areas. Disregarding for the present the fat factor, comparison of the protein to selenium ratio in diets 25 and 28 shows a ratio of 1:100 in the former and approximately 1:33 in the latter, if we express this ratio in terms of percent of protein in the diet to micrograms of selenium per 100 grams of diet. Thus, diet 25 with a protein-selenium ratio of only 1:100 is highly toxic, while a protein-selenium ratio of 1:33, as in diet 28, is scarcely, if at all, toxic. In our earlier experiments on cats, which have recently been published (*2*), in which naturally occurring food selenium was fed as a supplement of wheat protein-selenium up to 1.0 mg. per kilo per day in a diet of meat and milk with relatively little untoward effects, analysis in the light of the present results shows that the animals were receiving protein and selenium in their diet in the ratio of about 1:50 on the highest selenium intake of 1 mg. per kilo per day, about 1:30 on the selenium intake of 0.5 mg. per kilo per day, and about 1:10 on the lowest intake of 0.1 mg. selenium per kilo per day. In the experiments on rabbits

(*2*), in which the toxic effects of selenium as it occurs naturally in oats were as a rule more pronounced, simple calculation indicates that in those animals the protein-selenium ratio was only 1:87 in animals receiving oats exclusively and about 1:25 in animals receiving unlimited nonseleniferous cabbage in addition to the seleniferous oats. The seleniferous oats contained 14 parts per million of selenium and 2.6 percent of nitrogen. In the light of the present experiments it is entirely clear, therefore, why the toxic effects of selenium should have been more pronounced in the rabbits than in the cats, even though their daily intake of selenium per kilogram of body weight was less.

More recently seleniferous wheat has been fed in this laboratory to rabbits with daily supplements of 100 grams of non-seleniferous cabbage to provide vitamins and minerals. The effects have been uniformly more severe than those previously noted with seleniferous oats, although the selenium intake in the wheat-fed animals has not exceeded 0.2 to 0.3 mg. per kilo per day. The protein-selenium ratio in these experiments has been close to 1:100.

Similar analysis of results published by other laboratories would, it is believed, explain many of the discrepancies. Moreover, it should be evident that data on the relative toxicity of food selenium from different sources, without adequate regard for the protein and fat content of the diet, as reported heretofore from some laboratories, are quite meaningless.

Application of the results of the present studies to conditions prevailing in the field leads to interesting speculation. It is the experience of farmers in selenium-endemic areas that pigs are usually most readily and most uniformly affected, and that the most conspicuous symptoms are stunted growth and extensive loss of hair. Such animals, we are told, usually make good recoveries if changed to a nutritious selenium-free diet. The analogy with the present experiments on the low protein-high fat diet is perhaps more than superficial, Furthermore, there is much variation in individual and species susceptibility to seleniferous vegetation and grain in livestock, as has been our experience with laboratory animals. Smith, Franke, and Westfall (*11*) reported data on selenium analysis of urines of one colt and three horses in various stages of "alkali" disease and found a concentration varying from 33 to 170 micrograms percent. Similar analysis of urines from 5 cows in various stages of "alkali" disease, obtained by the author in the course of a field investigation, disclosed a variation of from 61 to 104, and, in one instance, 300 micrograms percent. The 5 cows were selected from a herd of about 50 head of cattle as the only ones that had showed some degree of involvement. On the basis of the data reported by Smith, Westfall, and Stohlman (*12*) it may be estimated that these animals were probably not absorbing any more than 0.3 mg. of selenium per kilo per day, and in most cases

probably much less. Evidently some other factor than the selenium as such must be looked for in explanation of the greater susceptibility of these few animals as compared with the rest of the herd.

The results of the present experiments, it is believed, have an important bearing on the question of the selenium health hazard to man and its control. In 1937 it was reported by Smith and Westfall (*13*) that humans in selenium-endemic rural areas are exposed to the more or less continued ingestion of food selenium up to possibly as much as 0.2 mg. per kilo per day. Additional evidence obtained in this laboratory since that time indicates that this is true not only of the farming population living on seleniferous soil, but also to some extent of the population in general, including town dwellers living within selenium-endemic areas. No convincing evidence of serious chronic selenium poisoning from this source in man has ever been reported. A comprehensive study of the probable sources of selenium to which man is exposed showed that locally produced eggs, meats, and milk, next to cereals and vegetables, were of greatest importance (*13*). The highest concentration of selenium found in many specimens of eggs, a few meats, and many samples of milk showed 914, 800, and 127 micrograms percent, respectively. This gives a protein-selenium ratio of about 1:70, 1:50, and 1:40, respectively. Usually the selenium content of such foodstuffs was much lower, and consequently the protein-selenium ratio much more favorable than in the few extreme instances cited. Since naturally occurring selenium in foodstuffs is now well known to be associated with proteins, it would seem that nature has indeed provided her own, if only a partial, solution to this problem. It would also seem that the greatest selenium hazard to man would come from the ingestion of foods with high selenium and low protein content, as may be the case with occasional samples of cereal grains and vegetables. The writer had occasion on one of his field investigations to obtain 9 specimens of milled products, picked at random, in a milling plant located within a selenium-endemic area in one of the Great Plains States. These included various wheat and corn flours. The selenium content of these flours varied from 40 to 175 micrograms percent in 7 of the specimens, 2 containing none. The most unfavorable protein-selenium ratio in such flours might be 1:20, and this is scarcely likely to cause serious harm. The writer was informed, however, that grain from areas known to produce cereals with high selenium content was assiduously avoided. Whether this was done by actual analysis for selenium or by general knowledge of local conditions could not be ascertained.

It would thus appear that as long as those of the population who are heavily exposed to selenium refrain from consuming highly contaminated cereals and vegetables, the selenium hazard is probably

not serious even if small amounts are more or less regularly ingested with food products of animal origin.

CONCLUSIONS

Experiments made on rats show that the toxicity of naturally occurring food selenium is largely determined by dietary factors. A level of intake of selenium which is highly toxic and tissue-damaging when fed in a diet of low protein and high carbohydrate content is only slightly harmful, if at all, when fed in a diet of high protein and low carbohydrate content. The same level of selenium intake in a low protein and high fat diet causes stunted growth and extensive loss of hair, but no other demonstrable tissue damage except some fatty degeneration of the polygonal cells of the liver. Such animals are quickly restored to a normal condition when returned to a balanced nonseleniferous diet.

All the available evidence indicates that the effects and toxicity of naturally occurring food selenium are determined within certain limits not so much by the level of intake as hitherto supposed, as by the protein-selenium ratio in the diet. At a level of 10 parts per million of selenium, a ratio of 1 percent of protein in the diet to about 30 micrograms or less of selenium per 100 grams of diet is of little, if any, toxicity. A ratio of 1 percent protein to 100 micrograms of selenium per 100 grams of diet under the same conditions is dangerously toxic.

Whether the quality as well as the quantity of protein in the diet plays a role in determining the toxicity of selenium is not known at present. This and many other questions will have to be worked out in the future.

ACKNOWLEDGMENTS

I am indebted to Dr. R. D. Lillie for the microscopic examination of the tissues, to Dr. B. B. Westfall for the selenium analyses and to Mr. E. F. Stohlman for the hematological studies.

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COURT DECISION ON PUBLIC HEALTH

Judgment for employer in action brought by employee because of contraction of echinococcosis.—(Nebraska Supreme Court; *Russo* v. *Swift and Co.*, 286 N. W. 291; decided June 2, 1939.) The plaintiff entered the employ of the defendant company as a beef washer in 1925. He continued in such employment until December 1935, when he became totally and permanently disabled as a result of echinococcosis. He brought an action against the employer, charging the latter with negligence. As stated by the court the plaintiff alleged that he "contracted said echinococcosis, not as a result of any negligence on his part, but through the sole and proximate negligence on the part of defendant and its agents, in purchasing cattle which they knew, or, with the exercise of reasonable care, should have known, were infected with the disease; in negligently failing to discover that said cattle were so infected, and negligently failing to destroy and otherwise place said infected cattle in a position where the disease could not spread to this plaintiff; in failing to warn the plaintiff that such cattle were infected; in permitting plaintiff to unknowingly handle cattle which the defendant knew, or should have known, were infected with a dangerous and contagious disease; in failing to provide plaintiff with gloves or suitable apparatus which would protect him from the ravages of a dangerous and contagious disease, and in failing to provide ventilators, disinfectants, or any other proper method of exterminating said disease." The employee fixed the time of contracting the disease as sometime during the year 1933, when, he alleged, he gradually absorbed the disease through the pores and skin of his hands and through his lungs. The defendant company, by demurring, admitted the truth of all such facts as were well pleaded by the plaintiff and all intendments and inferences that could fairly and reasonably be drawn therefrom, but challenged that his petition alleged facts sufficient to constitute a cause of action.

The trial court sustained the demurrer and, on appeal by plaintiff, the supreme court affirmed the judgment of the trial court. The ap-

pellate court, after quoting from medical and other authorities, stated that the plaintiff in his occupation as a beef washer was not suffering from an occupational disease. The court then discussed the duty owed by an employer to an employee and quoted, among other things, the following from an Iowa case: "The master is required to anticipate and foresee or guard against what usually happens, or is likely to happen, but is not required to anticipate or foresee and guard against that which is unusual and not likely to happen. * * * The test is not whether the injurious result or consequence was possible but whether it was probable." In deciding against the employee, the appellate court said:

> Are we to say, in considering the duty of the defendant (employer) toward the plaintiff (employee), that the defendant was guilty of negligence towards the plaintiff in failing to exercise reasonable care, in failing to use the intelligence, ordinarily required in the industry, in furnishing a safe place to work and proper appliances, and in failing to warn the plaintiff? The very nature of the disease of echinococcosis and the manner in which it is contracted are indicative of the fact that an exceptional and unusual standard of care would be necessary on the part of the defendant industry to know or anticipate its existence, and such duty is not required of an employer. We repeat: Under the circumstances as pleaded by the plaintiff, is the disease one which can fairly and reasonably be charged to the knowledge of the defendant? There must be reasonable ground on which to charge the defendant with notice of the existence of the disease. Again referring to the definition of the disease, it is apparent that the term "echinococcus" refers to a parasite, which has its own life cycle, acquired by ingestion and not through the pores and the skin, and in extremely rare instances by inhalation. None of the cases cited by the plaintiff goes to the extent, as contended by him, if [of?] establishing a cause of action under the averments of the second amended petition.

It was also held that the plaintiff's petition, wherein he sought to allege a cause of action under certain health and safety statutes, was defective in failing to allege sufficient facts to show a violation of the said statutes.

DEATHS DURING WEEK ENDED JULY 15, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 15, 1939	Corresponding week, 1938
Data from 87 large cities of the United States:		
Total deaths	7,582	[1] 7,731
Average for 3 prior years	[2] 9,526	
Total deaths, first 28 weeks of year	241,830	234,686
Deaths under 1 year of age	466	[1] 515
Average for 3 prior years	[2] 572	
Deaths under 1 year of age, first 28 weeks of year	14,255	14,649
Data from industrial insurance companies:		
Policies in force	67,044,842	69,130,363
Number of death claims	11,529	11,499
Death claims per 1,000 policies in force, annual rate	9.0	8.7
Death claims per 1,000 policies, first 28 weeks of year, annual rate	10.9	9.6

[1] Data for 88 cities.
[2] Data for 85 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 22, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	4	1	......	......	5	......	151	25	12	14
New Hampshire	0	0	0	0	......	......	......	......	20	2	4	3
Vermont	0	0	0	0	......	......	......	......	389	29	23	13
Massachusetts	6	5	1	8	......	......	......	......	243	207	167	126
Rhode Island	0	0	0	0	......	......	......	......	221	29	4	16
Connecticut	3	1	2	2	3	1	1	1	145	49	14	41
MID. ATL.												
New York	4	11	10	16	[1] 2	[1] 3	[1] 2	[1] 3	197	491	673	660
New Jersey	1	1	6	8	4	3	2	......	18	15	65	183
Pennsylvania	5	10	13	28	......	......	......	......	31	61	275	553
E. NO. CEN.												
Ohio	10	13	8	8	2	2	......	8	5	7	58	173
Indiana	3	2	10	8	12	8	......	10	12	8	16	20
Illinois	12	19	18	18	1	2	7	7	10	15	58	167
Michigan [2]	5	5	10	11	......	......	......	......	77	73	329	115
Wisconsin	4	2	2	3	4	2	13	14	218	124	384	384
W. NO. CEN.												
Minnesota	0	0	8	5	2	1	1	......	33	17	79	25
Iowa	2	1	1	6	......	......	......	......	130	64	41	18
Missouri	6	5	5	10	......	......	1	11	1	1	8	35
North Dakota	37	5	2	0	......	......	......	......	15	2	28	13
South Dakota	0	0	2	1	......	......	......	......	60	8	......	1
Nebraska	4	1	0	2	......	......	......	......	8	2	12	7
Kansas	6	2	2	3	3	1	3	3	59	21	17	17

See footnotes at end of table.

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Cases of certain diseases reported by telegraph by State health officers for the week ended July 22, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	----	----	----	----	79	4	5	3
Maryland [1]	3	1	5	5	3	1	6	2	81	10	25	33
Dist. of Col.	8	1	6	6	----	----	----	----	113	14	7	7
Virginia	19	10	8	8	37	20	----	----	88	47	59	54
West Virginia	24	9	2	3	27	10	9	9	8	3	11	17
North Carolina [3]	16	11	17	11	6	4	----	----	47	32	115	75
South Carolina [3]	8	3	9	3	300	110	68	44	8	3	13	13
Georgia [3]	13	8	18	7	42	25	----	----	10	6	----	----
Florida [3]	12	4	5	5	12	4	----	----	21	7	14	7
E. SO. CEN.												
Kentucky	8	2	7	3	----	----	3	3	7	4	53	53
Tennessee [3]	4	2	5	5	35	20	14	8	5	3	33	33
Alabama [3]	12	7	11	13	12	7	19	7	46	26	5	6
Mississippi [1, 3]	18	7	15	8	----	----	----	----	0	0	----	----
W. SO. CEN.												
Arkansas	7	3	6	8	25	10	12	8	20	8	22	4
Louisiana [3]	17	7	24	11	84	14	6	6	87	36	4	4
Oklahoma	2	1	3	4	8	4	24	13	10	5	9	7
Texas [3]	8	10	23	23	26	31	74	89	45	54	20	55
MOUNTAIN												
Montana	0	0	0	1	28	3	----	----	393	42	83	4
Idaho	0	0	1	0	----	----	2	----	20	2	9	9
Wyoming	0	0	1	0	----	----	----	----	87	4	1	6
Colorado [4]	63	13	4	4	29	6	----	----	43	9	24	24
New Mexico	25	2	0	1	----	----	----	----	12	1	8	8
Arizona	0	0	3	1	159	13	11	6	74	6	38	7
Utah [3]	0	0	0	0	----	----	----	----	179	18	55	23
PACIFIC												
Washington	3	1	1	0	----	----	----	----	644	209	11	36
Oregon	20	4	3	2	30	6	7	8	179	86	8	8
California	19	23	18	23	6	7	23	12	258	315	277	277
Total	8	213	301	310	15	818	813	238	87	2,154	3,126	3,126
29 weeks	15	10,972	13,097	13,995	245	150,548	44,716	103,000	480	344,403	754,176	660,952

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	12	2	5	5
New Hampshire	0	0	0	0	0	0	0	0	10	1	0	1
Vermont	0	0	0	0	0	0	0	0	27	2	3	3
Massachusetts	0	0	0	1	1.2	1	1	5	36	31	61	54
Rhode Island	8	1	0	0	0	0	0	0	23	3	9	8
Connecticut	0	0	1	0	3	1	1	1	42	14	12	7
MID. ATL.												
New York	0.4	1	4	4	2.8	7	2	8	30	75	84	136
New Jersey	2.4	2	1	1	1.2	1	0	1	29	24	10	28
Pennsylvania	8	6	4	2	2.5	5	1	1	48	94	77	114

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 22, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–1938, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–1938, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–1938, median
E. NO. CEN.												
Ohio	0	0	0	2	1.5	2	0	2	31	40	39	67
Indiana	1.5	1	1	1	0	0	1	1	39	26	14	22
Illinois	1.3	2	2	8	4	6	1	2	41	63	87	102
Michigan [2]	2.1	2	0	1	18	17	6	2	80	76	81	86
Wisconsin	0	0	0	0	0	0	0	0	53	30	43	63
W. NO. CEN.												
Minnesota	0	0	0	0	1.9	1	0	0	37	19	29	29
Iowa	0	0	0	1	0	0	1	1	18	9	13	19
Missouri	0	0	0	1	2.6	2	0	0	13	10	11	21
North Dakota	0	0	0	0	7	1	0	0	22	3	9	7
South Dakota	0	0	0	0	0	0	2	0	128	17	3	4
Nebraska	0	0	0	0	4	1	1	0	11	3	4	4
Kansas	2.8	1	2	2	0	0	0	0	50	18	21	17
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	39	2	1	1
Maryland [2]	0	0	2	2	0	0	0	0	31	10	3	12
Dist. of Col.	0	0	0	0	0	0	0	0	0	0	1	3
Virginia	0	0	1	2	1.9	1	2	2	28	15	11	13
West Virginia	0	0	2	2	5	2	0	0	35	13	11	11
North Carolina [3]	1.5	1	1	2	4	3	0	2	29	20	9	10
South Carolina [3]	0	0	2	1	33	12	0	0	0	0	2	2
Georgia [3]	1.7	1	1	1	8	5	2	2	22	13	10	4
Florida [3]	0	0	0	0	9	3	1	0	9	3	9	3
E. SO. CEN.												
Kentucky	1.7	1	3	2	1.7	1	1	2	17	10	13	12
Tennessee [3]	4	2	1	2	1.8	1	2	3	21	12	9	11
Alabama [3]	4	2	3	2	0	0	1	1	5	3	8	8
Mississippi [2] [3]	2.5	1	0	0	2.5	1	3	3	0	0	6	7
W. SO. CEN.												
Arkansas	2.5	1	0	0	2.5	1	0	0	0	0	2	2
Louisiana [3]	0	0	3	1	2.4	1	3	3	15	6	5	4
Oklahoma	0	0	0	1	0	0	0	0	2	1	12	11
Texas [3]	0.8	1	2	1	6	7	2	2	12	15	23	31
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	103	11	4	4
Idaho	0	0	1	1	0	0	0	0	0	0	3	3
Wyoming	0	0	0	0	0	0	0	0	0	0	1	3
Colorado [4]	0	0	3	1	10	2	0	0	82	17	23	9
New Mexico	0	0	0	0	12	1	1	0	86	7	5	6
Arizona	0	0	0	0	0	0	0	1	49	4	3	3
Utah [2]	0	0	0	0	0	0	0	0	99	10	9	9
PACIFIC												
Washington	0	0	3	0	0	0	0	0	31	10	16	11
Oregon	0	0	0	0	0	0	0	1	20	4	12	12
California	0.8	1	2	2	42	51	8	21	56	68	73	73
Total	1.1	27	45	50	5	137	43	227	32	814	899	1,131
29 weeks	1.7	1,259	2,008	3,860	1.6	1,157	668	1,599	156	113,489	133,844	161,216

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 22, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases	1934–38, median	July 22, 1939, rate	July 22, 1939, cases	July 23, 1938, cases
NEW ENG.											
Maine	0	0	0	0	24	4	2	2	86	6	31
New Hampshire	0	0	0	0	0	0	1	1	51	5	0
Vermont	0	0	0	0	0	0	0	0	402	30	20
Massachusetts	0	0	0	0	2	2	2	4	146	124	89
Rhode Island	0	0	0	0	23	3	1	0	115	15	6
Connecticut	0	0	0	0	0	0	1	1	151	51	78
MID. ATL.											
New York	0	0	0	0	4	10	12	12	142	356	624
New Jersey	0	0	0	0	4	3	13	5	346	291	330
Pennsylvania	0	0	0	0	8	16	17	17	314	618	327
E. NO. CEN.											
Ohio	3	4	0	0	7	9	6	10	79	108	93
Indiana	6	4	10	0	16	11	11	9	281	189	8
Illinois	3	4	10	10	7	11	25	22	238	863	499
Michigan [2]	3	3	1	0	6	6	2	4	284	269	489
Wisconsin	2	1	3	5	2	1	0	1	460	262	335
W. NO. CEN.											
Minnesota	0	0	9	4	2	1	0	1	43	22	76
Iowa	16	8	13	9	8	4	7	2	67	33	15
Missouri	4	3	11	0	28	22	21	21	63	49	83
North Dakota	29	4	4	0	0	0	0	1	51	7	29
South Dakota	23	3	1	1	8	1	0	0	15	2	21
Nebraska	8	2	1	2	0	0	0	0	141	87	21
Kansas	0	0	4	4	6	2	9	10	42	15	115
SO. ATL.											
Delaware	0	0	0	0	20	1	0	1	59	3	6
Maryland [2]	0	0	0	0	19	6	7	11	176	57	40
Dist. of Col.	0	0	0	0	24	8	3	2	209	87	13
Virginia	0	0	0	0	30	16	18	28	201	107	76
West Virginia	0	0	0	0	32	12	15	15	70	26	24
North Carolina [3]	0	0	0	1	37	25	27	25	349	239	334
South Carolina [3]	0	0	0	0	82	30	23	23	68	25	104
Georgia [3]	0	0	0	0	33	20	52	52	139	84	52
Florida [3]	0	0	0	0	15	5	5	3	112	37	19
E. SO. CEN.											
Kentucky	0	0	7	0	52	30	41	41	80	46	46
Tennessee [3]	0	0	1	0	49	28	39	39	106	60	48
Alabama [3]	0	0	0	0	11	6	15	16	125	71	49
Mississippi [2, 3]	0	0	0	0	23	9	12	17	-------	-------	-------
W. SO. CEN.											
Arkansas	0	0	2	0	64	26	26	26	37	15	15
Louisiana [3]	0	0	0	0	104	43	17	25	63	26	43
Oklahoma	4	2	0	0	48	24	24	27	4	2	19
Texas [3]	1	1	3	1	43	52	63	63	66	80	157
MOUNTAIN											
Montana	0	0	4	4	0	0	0	1	56	6	54
Idaho	0	0	8	2	0	0	1	1	81	3	6
Wyoming	44	2	1	0	44	2	0	0	0	0	7
Colorado [4]	10	2	1	1	24	5	10	8	135	28	48
New Mexico	0	0	1	0	37	3	3	6	235	19	18
Arizona	12	1	1	0	25	2	2	2	209	17	-------
Utah [2]	0	0	0	0	0	0	7	1	477	48	50
PACIFIC											
Washington	0	0	10	5	6	2	2	2	68	22	73
Oregon	10	2	2	2	10	2	0	8	114	23	28
California	0	0	15	1	6	7	6	7	109	183	240
Total	2	46	123	85	18	465	548	647	164	4,061	4,798
29 weeks	12	8,500	12,393	5,860	7	5,066	5,816	5,816	158	113,405	125,842

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Typhus fever, week ended July 22, 1939, 82 cases as follows: North Carolina, 12; South Carolina, 8; Georgia, 35; Florida, 5; Tennessee, 1; Alabama, 13; Mississippi, 1; Louisiana, 4 (delayed report); Texas, 8.
[4] Colorado tick fever, Colorado, 1 case.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to July 29, 1939

	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	Week ended July 22	Week ended July 29
Eastern:							
New York				3	8		
New Jersey				4	8	1	2
Pennsylvania				6	3	1	
Delaware				3			
Maryland			7	13	11	5	2
District of Columbia			2	2	2	1	1
Virginia			1	13	10	1	4
North Carolina				3	13	5	2
Georgia					1		1
Central:							
Ohio				3	2		2
Indiana				2	1		
Illinois			1	1	5	2	
Tennessee			1		3	3	1
Iowa			1	10	9	2	
Missouri				1			3
Western:							
Montana	[1] 2	2	8	5	1		1
Idaho		4	7	4	5		
Wyoming		3	14	16	5	3	
Colorado		2	3	9	4		
Utah		2	5	5	6	2	
Washington		2	3	2			
Oregon		9	16	7	2		

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
June 1939										
Alabama	8	11	154	662	861	23	8	41	1	27
Arizona	0	13	159	8	48	5	23	44	4	9
California	7	101	92	27	5,695	5	51	454	113	28
Colorado	1	48	83		294		5	107	13	11
Florida	0	20	81	16	238	22	6	28	0	11
Georgia		31	201	247	219	54	10	22	18	72
Hawaii Territory	0	11	4		12		0	0	0	0
Idaho	0	4			159		0	7	1	2
Illinois	8	99	48	18	129	3	6	722	59	35
Indiana	2	19	14	3	33		2	232	49	16
Louisiana	0	29	25	118	130	14	1	25	0	66
Maryland	3	6	10	1	535	5	0	42	0	5
Michigan	2	87	8	4	1,226		6	1,099	26	13
Minnesota	1	14	12	3	613		2	146	18	6
Mississippi	8	25	799	5,397	835	618	1	14	0	22
New York	11	42		18	6,546		8	1,159	30	44
Oklahoma	2	9	67	203	456	31	1	31	77	37
Rhode Island	0	4			464		0	29	0	3
South Dakota	3	1	34		321		0	47	31	0
Tennessee	8	13	70	138	276	19	1	99	104	32

Summary of monthly reports from States—Continued

June 1939

	Cases
Actinomycosis:	
California	
Botulism:	
New York	6
Chickenpox:	
Alabama	46
Arizona	8
California	1,737
Colorado	113
Florida	58
Georgia	50
Hawaii Territory	63
Idaho	8
Illinois	1,144
Indiana	133
Louisiana	12
Maryland	143
Michigan	933
Minnesota	307
Mississippi	302
New York	2,367
Oklahoma	35
Rhode Island	53
South Dakota	12
Tennessee	59
Conjunctivitis:	
Georgia	4
Hawaii Territory	44
Oklahoma	5
Dengue:	
Florida	1
Mississippi	4
Diarrhea:	
Maryland	26
Dysentery:	
Arizona (bacillary)	117
California (amoebic)	10
California (bacillary)	60
Colorado	2
Florida (amoebic)	5
Florida (bacillary)	1
Georgia (amoebic)	10
Georgia (bacillary)	163
Illinois (amoebic)	5
Illinois (bacillary)	14
Illinois (amoebic carriers)	24
Louisiana (amoebic)	7
Maryland (unspecified)	6
Maryland (amoebic)	1
Maryland (bacillary)	6
Michigan (amoebic)	4
Michigan (bacillary)	5
Michigan (unspecified)	1
Minnesota (amoebic)	2
Minnesota (bacillary)	6
Mississippi (amoebic)	207
Mississippi (bacillary)	3,006
New York (amoebic)	5
New York (bacillary)	25
Oklahoma (amoebic)	1
Oklahoma (bacillary)	43
Tennessee (amoebic)	3
Tennessee (bacillary)	67
Encephalitis, epidemic or lethargic:	
Alabama	1
California	2
Florida	3
Illinois	1
Indiana	2
Michigan	1
New York	6
Oklahoma	1
Food poisoning:	
California	300
German measles:	
Alabama	3
Arizona	3
California	69
Florida	2
Idaho	15
German measles—Continued.	
Illinois	21
Maryland	19
Michigan	54
New York	96
Rhode Island	2
Tennessee	4
Glanders:	
South Dakota	1
Granuloma, coccidioidal:	
California	5
Hookworm disease:	
Florida	384
Georgia	1,024
Hawaii Territory	4
Louisiana	36
Mississippi	829
Oklahoma	7
Impetigo contagiosa:	
Hawaii Territory	22
Illinois	1
Maryland	1
Oklahoma	4
Tennessee	8
Jaundice:	
Maryland	1
Minnesota	15
Leprosy:	
Florida	1
Hawaii Territory	1
Mumps:	
Alabama	48
Arizona	29
California	1,824
Colorado	23
Florida	74
Georgia	129
Hawaii Territory	86
Idaho	9
Illinois	463
Indiana	92
Maryland	137
Mississippi	227
Oklahoma	15
Rhode Island	96
South Dakota	8
Tennessee	29
Ophthalmia neonatorum:	
Alabama	1
California	4
Illinois	3
Maryland	1
Minnesota	1
Mississippi	9
New York [1]	7
Tennessee	4
Puerperal septicemia:	
Mississippi	23
Tennessee	1
Rabies in animals:	
Alabama	30
California	118
Illinois	16
Indiana	41
Louisiana	4
Mississippi	11
New York	13
Oklahoma	25
Rhode Island	3
Rabies in man: Michigan	1
Rocky Mountain spotted fever:	
Colorado	5
Georgia	1
Idaho	6
Illinois	1
Indiana	3
Maryland	14
New York	4
Oklahoma	1
Tennessee	2
Septic sore throat:	
California	4
Colorado	5
Florida	5
Georgia	78
Illinois	3
Indiana	1
Louisiana	2
Maryland	22
Michigan	25
Minnesota	12
New York	163
Oklahoma	77
Rhode Island	16
South Dakota	4
Tennessee	9
Tetanus:	
Alabama	7
California	4
Georgia	2
Hawaii Territory	2
Illinois	3
Louisiana	2
Maryland	1
Michigan	2
New York	4
Oklahoma	4
Tennessee	2
Trachoma:	
Arizona	69
California	16
Georgia	1
Hawaii Territory	1
Illinois	13
Maryland	1
Michigan	1
Mississippi	3
Oklahoma	5
Tennessee	2
Trichinosis:	
California	3
Georgia	1
Hawaii Territory	2
Illinois	2
New York	6
South Dakota	5
Tularaemia:	
California	4
Georgia	6
Illinois	6
Louisiana	2
Minnesota	4
New York	1
Tennessee	3
Typhus fever:	
Alabama	40
Florida	17
Georgia	68
Hawaii Territory	6
Louisiana	2
Mississippi	1
New York	1
Tennessee	5
Undulant fever:	
Alabama	4
Arizona	6
California	19
Colorado	1
Florida	4
Georgia	12
Idaho	3
Illinois	30
Indiana	5
Louisiana	6
Maryland	7
Michigan	11
Minnesota	9
Mississippi	4
New York	17
Oklahoma	77
Rhode Island	1
Tennessee	1

[1] Exclusive of New York City.

Summary of monthly reports from States—Continued

June 1939—Continued

	Cases
Vincent's infection:	
Florida	7
Illinois	10
Maryland	7
Michigan	17
New York [1]	68
Oklahoma	8
Tennessee	7
Whooping cough:	
Alabama	330

June 1939—Continued

	Cases
Whooping cough—Continued.	
Arizona	131
California	645
Colorado	174
Florida	114
Georgia	146
Hawaii Territory	234
Idaho	21
Illinois	1106
Indiana	258
Louisiana	86

June 1939—Continued

	Cases
Whooping cough—Continued.	
Maryland	208
Michigan	895
Minnesota	141
Mississippi	935
New York	1779
Oklahoma	30
Rhode Island	175
South Dakota	11
Tennessee	242

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 15, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	110	30	13	1,474	326	487	8	372	63	1,380	-------
Current week [1]	71	44	13	1,042	254	252	6	333	64	1,494	-------
Maine:											
Portland	0	------	0	2	1	2	0	0	0	6	15
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	10
Manchester	0	------	0	0	0	0	0	0	0	0	26
Nashua	0	------	0	0	0	0	0	0	0	0	8
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	4
Burlington	0	------	0	1	0	0	0	0	0	0	3
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	0	------	0	34	8	11	0	6	1	26	187
Fall River	1	------	0	2	1	0	0	1	0	3	36
Springfield	0	------	0	9	0	0	0	3	0	0	27
Worcester	0	------	0	15	8	1	0	2	0	15	50
Rhode Island:											
Pawtucket	1	------	-------	1	------	0	0	------	0	1	-------
Providence	0	------	0	48	2	0	0	2	0	20	59
Connecticut:											
Bridgeport	0	------	1	7	0	0	0	0	0	0	29
Hartford	0	------	0	9	2	0	0	0	0	10	37
New Haven	0	------	0	15	4	0	0	1	0	5	29
New York:											
Buffalo	0	------	0	23	2	7	0	4	0	22	107
New York	19	6	0	80	86	86	0	80	6	140	1,240
Rochester	2	1	0	24	1	0	0	0	1	4	55
Syracuse	0	------	0	267	1	0	0	1	0	46	52
New Jersey:											
Camden	0	------	0	0	0	4	0	0	2	4	23
Newark	0	------	0	1	1	2	0	2	0	57	83
Trenton	1	------	0	0	2	8	0	2	0	2	30
Pennsylvania:											
Philadelphia	0	2	2	0	12	8	0	14	5	153	453
Pittsburgh	2	------	1	4	9	11	0	6	2	70	133
Reading	0	------	0	1	0	0	0	1	0	0	19
Scranton	0	------	-------	0	------	2	0	------	0	1	-------
Ohio:											
Cincinnati	0	------	1	0	2	7	0	5	1	3	130
Cleveland	0	4	0	4	3	9	0	8	1	75	175
Columbus	0	------	0	8	8	1	0	1	0	15	67
Toledo	0	------	0	14	3	3	0	1	0	81	65
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	0	12
Fort Wayne	0	------	0	6	3	0	0	0	0	0	26
Indianapolis	1	------	0	4	6	7	0	2	1	90	101
Muncie	0	------	0	0	0	0	0	2	0	0	8
South Bend	0	------	0	0	0	0	0	1	0	24	12
Terre Haute	0	------	0	0	1	0	0	0	0	0	16

[1] Figures for Boise estimated; report not received.

City reports for week ended July 15, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Illinois:											
Alton	0	------	0	0	1	0	0	0	0	0	8
Chicago	12	------	1	10	14	35	0	33	2	112	595
Elgin	0	------	0	0	0	2	0	0	0	8	7
Moline	0	------	0	0	0	0	0	0	0	3	6
Springfield	0	------	0	0	3	0	0	1	1	1	27
Michigan:											
Detroit	3	------	0	20	6	23	0	14	2	98	220
Flint	0	------	0	2	1	0	1	0	0	7	23
Grand Rapids	0	------	0	2	2	5	0	0	0	3	29
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	0	6
Madison	0	------	0	8	5	0	0	0	0	20	23
Milwaukee	0	------	0	3	4	13	0	3	0	23	91
Racine	1	------	0	1	0	1	0	1	0	6	6
Superior	0	------	0	4	0	0	0	0	0	0	11
Minnesota:											
Duluth	0	------	0	0	1	0	0	0	0	3	16
Minneapolis	0	------	1	7	3	1	0	0	0	5	96
St. Paul	0	------	0	6	4	1	0	8	0	15	64
Iowa:											
Cedar Rapids	0	------	------	8	------	0	0	------	0	2	------
Des Moines	0	------	0	1	0	2	5	0	0	0	29
Sioux City	0	------	------	1	------	0	0	------	0	1	------
Waterloo	0	------	------	1	------	1	0	------	0	10	------
Missouri:											
Kansas City	1	------	1	1	3	2	0	2	0	1	91
St. Joseph	0	------	0	0	1	1	0	1	0	2	35
St. Louis	0	------	0	1	4	2	0	6	3	39	277
North Dakota:											
Fargo	1	------	0	0	0	0	0	0	0	0	4
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	1	2
South Dakota:											
Aberdeen	0	------	------	1	------	0	2	------	0	0	------
Sioux Falls	0	------	0	0	0	4	0	0	0	0	8
Nebraska:											
Omaha	0	------	0	1	2	2	0	0	0	5	55
Kansas:											
Lawrence	0	------	0	1	1	1	0	0	0	0	4
Topeka	0	------	0	0	0	2	0	0	0	5	28
Wichita	0	------	0	13	3	4	0	0	0	5	42
Delaware:											
Wilmington	0	------	0	1	0	2	0	0	1	1	28
Maryland:											
Baltimore	1	5	0	8	8	8	0	14	1	55	185
Cumberland	0	------	0	0	0	1	0	0	0	0	15
Frederick	0	------	0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	5	1	1	35	8	1	0	9	4	38	153
Virginia:											
Lynchburg	1	------	0	5	1	0	0	0	0	28	8
Norfolk	0	------	0	0	2	0	0	1	0	0	19
Richmond	0	------	0	22	1	1	0	3	0	0	63
Roanoke	0	------	0	4	1	0	0	0	0	1	13
West Virginia:											
Charleston	1	------	0	0	5	1	0	1	2	0	22
Huntington	0	------	------	0	------	1	0	------	1	0	------
Wheeling	0	------	0	0	1	0	1	1	0	5	24
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	0	0	0	0	0	6	9
Wilmington	1	------	0	1	2	0	0	0	0	0	8
Winston-Salem	0	------	0	0	0	1	0	1	0	1	8
South Carolina:											
Charleston	0	4	0	0	1	0	0	1	0	0	13
Florence	0	------	0	0	2	0	0	0	0	0	9
Greenville	0	------	0	0	2	0	0	0	0	0	25
Georgia:											
Atlanta	0	------	0	2	6	2	0	8	0	6	80
Brunswick	0	------	0	0	1	0	0	0	0	0	4
Savannah	0	1	0	0	0	0	0	2	0	14	35
Florida:											
Miami	1	4	0	0	1	0	0	2	0	5	24
Tampa	0	------	0	0	0	0	0	0	0	0	16
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	0	5
Covington	0	------	0	0	0	0	0	6	0	0	17
Lexington	0	------	0	0	0	0	0	2	0	0	17
Louisville	2	------	0	0	4	1	0	5	1	27	2

City reports for week ended July 15, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Tennessee:											
Knoxville	0	------	0	0	0	3	0	1	0	0	25
Memphis	0	------	1	0	0	0	0	8	1	76	84
Nashville	0	------	0	0	0	0	0	4	2	15	53
Alabama:											
Birmingham	0	2	0	0	5	0	0	3	1	6	67
Mobile	0	6	0	0	1	1	0	0	0	1	21
Montgomery	0	------	------	0	------	0	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	1	0	9	1	0	6	0	0	16
Louisiana:											
Lake Charles	0	------	0	1	0	0	0	0	0	0	2
New Orleans	0	------	0	6	5	4	0	10	7	21	160
Shreveport	0	------	0	1	6	0	0	1	4	1	45
Oklahoma:											
Oklahoma City	0	------	0	0	3	1	0	0	0	0	45
Texas:											
Dallas	0	------	0	1	7	0	0	2	4	2	62
Fort Worth	0	------	0	2	8	1	0	4	0	0	37
Galveston	0	------	0	0	0	0	0	0	0	0	17
Houston	4	------	0	11	9	2	0	9	4	14	98
San Antonio	1	------	0	1	7	0	0	3	1	0	79
Montana:											
Billings	0	------	0	0	0	1	0	2	0	1	12
Great Falls	0	------	0	9	0	2	0	0	0	0	8
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	1	0	0	0	0	7
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Colorado Springs	0	------	0	0	0	6	0	1	0	0	7
Denver	4	------	0	7	5	0	0	4	0	14	83
Pueblo	0	------	0	2	0	0	0	0	0	21	3
New Mexico:											
Albuquerque	0	------	0	0	0	1	0	1	2	0	11
Utah:											
Salt Lake City	0	------	0	7	1	2	0	0	2	19	39
Washington:											
Seattle	0	------	0	198	1	1	0	5	0	7	97
Spokane	0	------	0	7	2	1	0	0	2	0	29
Tacoma	0	------	0	2	3	0	0	0	0	0	27
Oregon:											
Portland	1	------	0	3	7	1	0	1	0	8	59
Salem	0	------	------	2	------	0	0	------	0	0	------
California:											
Los Angeles	6	8	0	76	2	12	0	18	0	15	324
Sacramento	2	1	1	12	8	3	4	1	0	1	32
San Francisco	1	3	1	3	3	2	0	10	0	5	153

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	0
New York:			
New York	0	0	2
Rochester	0	0	1
New Jersey:			
Camden	0	0	1
Newark	1	0	1
Pennsylvania:			
Pittsburgh	0	0	1
Indiana:			
Indianapolis	3	0	1
Illinois:			
Chicago	0	0	1
Michigan:			
Detroit	0	0	6

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Minnesota:			
Minneapolis	0	0	1
St. Paul	0	0	1
South Carolina:			
Charleston	0	0	3
Greenville	0	0	1
Tennessee:			
Nashville	0	0	1
Alabama:			
Birmingham	0	0	1
Arkansas:			
Little Rock	0	0	1
Texas:			
San Antonio	0	0	1
California:			
Los Angeles	0	0	5
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: Springfield, Ill., 2; Milwaukee, 1; Topeka, 2.
Pellagra.—Cases: Savannah, 1; Louisville, 4; San Francisco, 1.
Typhus fever.—Savannah, 1; Miami, 1; Mobile, 2; Lake Charles, 1; Galveston, 1; Houston, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended July 1, 1939.—During the week ended July 1, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		1						2
Chickenpox		8	4	64	145	15	11	16	29	292
Diphtheria		1		29	1	3	1			35
Dysentery				2	1					3
Influenza		8			5				20	42
Lethargic encephalitis				1	1					2
Measles		5	6	434	582	68	1	13	2	1,111
Mumps	3			18	55	4			4	84
Pneumonia	2	7			1				7	17
Poliomyelitis					3					3
Scarlet fever			17	62	70	15	9	10	4	187
Smallpox							1			1
Trachoma							10			10
Tuberculosis		16	13	84	73	52		4		242
Typhoid and paratyphoid fever			2	18						20
Whooping cough		19	13	60	98	15	35	6	43	289

JAMAICA

Communicable diseases—4 weeks ended July 8, 1939.—During the 4 weeks ended July 8, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Poliomyelitis	1	
Chickenpox	6	27	Puerperal septicemia		2
Diphtheria	8	9	Tuberculosis	44	77
Dysentery	5	2	Typhoid fever	6	76
Leprosy		2			

VIRGIN ISLANDS

Notifiable diseases—April–June 1939.—During the months of April, May, and June 1939, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	April	May	June	Disease	April	May	June
Chickenpox	155	73	23	Pneumonia	1	7	1
Filariasis	15			Syphilis	6	10	13
Gonorrhea	5	11	9	Tetanus	1		
Hookworm disease		1	3	Tuberculosis	5	3	2
Malaria	1			Whooping cough	1		
Pellagra	2	2					

YUGOSLAVIA

Communicable diseases—4 weeks ended June 18, 1939.—During the 4 weeks ended June 18, 1939, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	26	3	Poliomyelitis	2	1
Cerebrospinal meningitis	44	22	Scarlet fever	202	1
Diphtheria and croup	406	26	Sepsis	8	3
Dysentery	14	1	Tetanus	55	27
Erysipelas	163	4	Typhoid fever	174	14
Favus	5		Typhus fever	38	1
Paratyphoid fever	19				

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for July 28, 1939, pages 1409–1421. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Ceylon—Batticaloa.—During the week ended July 8, 1939, 1 death from cholera was reported in Batticaloa, Ceylon.

Plague

Argentina—Mendoza Province—Santa Rosa.—During the period July 1–15, 1939, 1 case of plague with 1 death was reported in Santa Rosa, Mendoza Province, Argentina.

British East Africa—Nyasaland—Central Shire District.—During the week ended July 22, 1939, plague was reported present in Central Shire District, Nyasaland, British East Africa.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauilo.—A rat found on June 23, 1939, in Paauilo, Hamakua District, Island of Hawaii, Hawaii Territory, has been proved positive for plague.

Smallpox

On vessel—S. S. Atalaya.—On July 25, 1939, 1 case of smallpox was reported on the Brazilian S. S. *Atalaya* at New Orleans, La. Everyone on board the vessel was vaccinated and all precautions were taken.

Yellow fever

Guinea (French).—For the period June 1–10, 1939, 2 cases of yellow fever were reported in French Guinea.

Niger Territory—Konni Circle.—During the period June 11–20, 1939, 3 cases of yellow fever were reported in Konni Circle, Niger Territory.

Senegal.—For the period June 11–20, 1939, yellow fever was reported in Senegal as follows: Bambey, 1 case; Diourbel, 6 cases; Ziguinchor, 10 cases, 5 deaths.

Sudan (French)—Bandiagara.—For the period June 11–20, 1939, 1 case of yellow fever was reported in Bandiagara, French Sudan.

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Public Health Reports

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

For the week ended August 5, 1939, a total of 208 cases of poliomyelitis was reported in the United States, as compared with 177 for the preceding week and with 250 cases for the 1934–38 median for the corresponding week.

The incidence of poliomyelitis remained favorable throughout the country except for the States of California, Michigan, and South Carolina.

California reported 57 cases, as compared with 46 during the preceding week, Michigan 46 as compared with 29, and South Carolina 17 as compared with 12 cases.

PLAGUE IN THE WESTERN PART OF THE UNITED STATES

INFECTION IN RODENTS, EXPERIMENTAL TRANSMISSION BY FLEAS, AND INOCULATION TESTS FOR INFECTION*

By C. R. Eskey, *Senior Surgeon*, and V. H. Haas, *Passed Assistant Surgeon, United States Public Health Service*

Part I. Plague Infection of Rodents

The introduction and spread of wild rodent plague.—Within 10 years after plague was first discovered at the port of San Francisco in 1900, the infection was proved to exist among ground squirrels (*Citellus beecheyi*) in 9 California counties south of San Francisco Bay. This region remained the only known permanent focus of infection until 1934, when ground squirrel epizootics occurred in the Sierra Nevada Mountain areas of California, and a human case of plague was reported from the Great Basin region of Oregon.

Since 1934 extensive field investigations conducted by the United States Public Health Service and the health departments of 5 States have resulted in the discovery of foci of wild rodent plague in 9 of the far western States, exclusive of California. The infection has been found on the eastern slope of the Great Divide in two States but not in the Great Plains area east of the Rocky Mountains.

*Résumé of a comprehensive, detailed report that is to be published as a Public Health Bulletin.

From the histories of wild rodent epizootics observed during the past 10 years and the location of recently discovered plague foci, as well as the occurrence of the severe type of epizootics that have been recently discovered in the more eastern foci, it would seem that wild rodent plague has been gradually extending eastward from the Pacific coast.

Wild rodents of one species or another find suitable conditions for their existence in all types of terrain found in the western States; consequently there have been no natural barriers to the spread of the infection. Whether or not the wild rodents inhabiting the region east of the Rocky Mountains will afford a suitable media for the continued dissemination of the infection over this territory is unknown at present.

That wild rodent plague may spread unnoticed over great areas unless intensive measures are taken to detect its presence may be explained by such factors as the dissemination of the disease through a rodent population of insufficient density to give rise to explosive epizootics, and the occurrence of epizootics among wild rodents having slight contact with man.

Plague among different kinds of wild rodents.—Thus far, plague infection has been demonstrated in nine species of ground squirrels. The infection has been disseminated to a greater extent by these animals than by any other wild rodents, because of their wide distribution, the overlapping of the ranges of different species, and the tendency of most species of ground squirrels to a communal existence in great numbers under proper conditions.

The round-tailed desert rats and white-tailed prairie dogs have been found to suffer from severe epizootics and to play an important part in the dissemination of the infection in the regions they inhabit.

Plague has been found a number of times among chipmunks and marmots in regions where ground squirrels were also known to be infected. It is likely that both chipmunks and marmots are of importance in maintaining limited reservoirs of the infection.

In a few instances tree squirrels and native mice have been found to be involved in the plague outbreaks of localities where active spread of the infection was occurring among other wild rodents.[1]

Domestic rat infestation.—West of the Rocky Mountains domestic rats are found only in communities on the Pacific coast, in the valleys of formerly navigable rivers, and a few other isolated places. This absence of domestic rats from most of the territory where wild rodent plague has been demonstrated to exist greatly reduces the hazard to human beings.

[1] Since this was written a plague-infected kangaroo rat was shot in New Mexico and a dead plague-infected cottontail rabbit was found in the State of Washington.

Part II. Flea Investigations

OBSERVATIONS ON THE ECOLOGY OF FLEAS

Flea infestation of wild rodents.—In the course of field surveys that have been conducted in the 11 far Western States, fleas have been collected from over 30,000 small wild animals, chiefly rodents, and the average number of each flea species per animal has been determined for all kinds of hosts. The flea infestation of different kinds of wild rodents varied greatly as regards both the species and the number of fleas per animal. Over 50 different species of fleas have been found on the western rodents. Some of the larger rodents were found to harbor excessive numbers of fleas, as in the case of the California ground squirrels, which averaged over 20 of these parasites per animal, and the marmots, with an average of over 10 fleas each, while there were other rodents that did not yield an average of 1 per animal. Certain rodents naturally harbored only 1 species of fleas, whereas others were the normal hosts for several species, but the latter animals, in most cases, did not harbor a greater number of fleas than those infested with only 1 or 2 species.

Host preference of fleas.—All species of wild rodent fleas were found to have a certain degree of host preference, which in the case of most flea species limited their natural hosts to one species of rodent or to certain rodent groups that were closely related biologically. In spite of this selectivity in their natural hosts, surveys showed that some interchange in fleas constantly occurs between all kinds of wild rodents inhabiting the same region and thus having environmental contact.

Existence of fleas apart from their hosts.—During the course of field investigations many wild rodent fleas were observed on the surface of the ground near burrow openings, in the burrow runs, and in excavated nests. Therefore, in estimating the number of fleas using wild rodents as hosts, those parasites present in the environmental surroundings should be taken into consideration as well as those that may be obtained from the bodies of the hosts.

The excavated nests of wild rodents which acted as hosts for different species of fleas were found to yield varying proportions of fleas in relation to the numbers which were obtained from the bodies of the animals using the nests; that is, the ratio of nest infestation to host infestation varied in the case of different species of fleas. From this it was concluded that some species of fleas exist apart from their hosts to a greater extent than others, thus explaining in part the small number of fleas found infesting certain kinds of rodents.

Although fleas may naturally live apart from their hosts for short periods, they probably do not exist very long in nests that have been abandoned, for fleas were not found in many excavated nests which failed to show evidence of recent occupation.

EXPERIMENTAL TRANSMISSION OF PLAGUE BY FLEAS

Experimental procedure.—In order to gain some knowledge regarding the ability of the more prevalent species of western fleas to act as vectors of plague, laboratory experiments in the flea transmission of plague were conducted with 31 species, consisting of 25 obtained from wild rodents and their nests, 3 from domestic rats, and 3 from miscellaneous animals. The wild rodent fleas included many species found on hosts that have been implicated in the spread of plague, while others were obtained from rodents among which no evidence of infection has been discovered. These experiments were conducted with individual fleas which were housed in separate test tubes, and a complete record was kept of every insect from the time it was collected until its death.

Fleas were exposed to infection by feeding them on plague-infected guinea pigs when the animals appeared to be so sick that they could live only a short time. In order to determine which of the exposed fleas were plague infected or which harbored *Pasteurella pestis* in the gastrointestinal tract, 18-hour bouillon cultures of the feces were inoculated into guinea pigs about 5 days following exposure. The feces of fleas which failed to be infectious to guinea pigs the first time were tested again, and, if the second test was negative, the parasites were again fed on infected guinea pigs. Some fleas were exposed to infection 6 or 7 times before plague organisms were demonstrated in the feces. These feces tests were made at intervals during the life of infected fleas to determine whether or not they continued to excrete virulent organisms.

Fleas were placed in contact with guinea pigs every other day until plague organisms were found in their feces; after that they were afforded a chance to feed every day. If a flea did not attempt to feed within 1 minute, it was removed from the abdomen of the guinea pig.

After death, each flea was examined microscopically to determine its species and sex, and for evidence of plague infection. The bodies of all fleas used in the experiments were inoculated into guinea pigs.

Infectiousness of guinea pigs' blood for fleas.—In attempting to infect fleas with plague, 5,793 feedings were given on 247 guinea pigs. Although all of these animals were very sick when used as hosts, 40 percent of them failed to infect a single one of the fleas that ingested their blood. None of the guinea pigs that lived over 42 hours after fleas had fed on them were infectious and few fleas were infected by animals that survived over 18 hours. Only 70 percent of the infected hosts which died in less than 18 hours after exposure of fleas were found to have infected one or more parasites.

The infectiousness of plague-infected guinea pigs' blood was found to bear a close relationship to the degree of bacteriemia as shown by

heart blood cultures and smears. No flea was infected by blood which failed to show the presence of *P. pestis* in cultures. Fleas were fed on 30 guinea pigs whose blood was found to contain *P. pestis* upon culture and on 9 animals from which positive smears were obtained, without any of the exposed parasites being infected. Only 32 percent of fleas were plague infected by the ingestion of blood which was found to contain 10 or more organisms in each microscopic field of smear preparations, while less than 17 percent flea infection resulted from blood found to contain *P. pestis* upon culture but in which no organisms were observed in the smears.

The virulence of the infection in the guinea pig hosts had little effect in determining the infectiousness of their blood by flea feeding, as the percentage of exposed fleas that were infected was about the same regardless of whether the guinea pigs died 3 or 4 days after inoculation or whether they lived for 7 or 8 days.

The results obtained in the experiments on the infection of fleas by feeding on guinea pigs suggest that, under natural conditions, fleas are rarely infected by animals which recover from plague or suffer from a chronic form of the disease. From this it would seem that fleas would not be infected by hosts that have a certain amount of natural immunity to plague.

Plague infection of different species of fleas.—During this investigation 635 female and 259 male fleas were found to excrete virulent plague organisms in their feces after having fed on infected guinea pigs. Infection followed in 25 percent of exposures to guinea pigs whose blood was infectious to one or more fleas fed on them. Fleas of 31 species were infected, which included all species that were properly tested. As a great many guinea pigs had to be used for infecting fleas, the percentage of infection of each flea species during these experiments did not afford very reliable data for comparing the susceptibility to infection of the different species, because feeding the same species of fleas on different guinea pigs, all of which were known to have a high degree of septicemia, resulted in varying proportions of flea infection by the blood of the different animals. Most of the wild rodent fleas seemed to be as readily infected as domestic rat fleas. Both sexes were equally susceptible to infection.

The number of fleas of each species infected with plague during these experiments and their usual hosts were as follows:

Flea	*Host*
140 ***Xenopsylla cheopis*** (Roth 1903)	Domestic rats.
51 ***Nosopsyllus fasciatus*** (Boxe 1801)	Do.
5 ***Leptopsylla segnis*** (Schen 1816)	Do.
19 ***Diamanus montanus*** (Baker 1895)	Ground squirrels.
5 ***Hoplopsyllus anomalus*** (Baker 1904)	Do.
6 ***Thrassis petiolatus*** (Baker 1904)	Do.
178 ***Opisocrostis labis*** (J & R 1922)	Do.

Flea	*Host*
58 *Thrassis pandorae* (Jell. 1937)	Domestic rats.
3 *Oropsylla rupestris* (Jord. 1929)	Do.
15 *Oropsylla idahoensis* (Baker 1904)	Do.
21 *Thrassis francisi* (Fox 1927)	Do.
58 *Thrassis arizonensis* (Baker 1898)	Desert ground squirrels.
7 *Thrassis gladiolis* (Jord. 1925)	Do.
10 *Opisocrostis tuberculatus* (Baker 1904)	Ground squirrels and prairie dogs.
70 *Opisocrostis hirsutus* (Baker 1895)	Prairie dogs.
8 *Thrassis* (*acamantis*) *acamantis* (Roth 1905)	Marmots.
6 *Thrassis* (*acamantis*) *howelli* (Jord. 1925)	Do.
31 *Monopsyllus eumolpi* (Roth 1905)	Chipmunks.
9 *Monopsyllus ciliatus* (Baker 1904)	Do.
81 *Orchopeas sexdentatus* (Baker 1904)	Wood rats.
9 *Anomiopsyllus mudatus* (Baker 1898)	Do.
6 *Megarthroglossus longispinus* (Baker 1895)	Do.
74 *Malareus telchinum* (Roth 1905)	Native mice.
13 *Catallagia wymani* (Fox 1909)	Do.
2 *Monopsyllus wagneri* (Baker 1904)	Do.
1 *Atyphloceras multidentatus* (Fox 1909)	Do.
2 *Hystrichopsylla dippiei* (Roth 1902)	Miscellaneous.
2 *Neopsylla inopina* (Roth 1915)	Ground squirrels.
1 *Hoplopsyllus affinis* (Baker 1904)	Rabbits.
2 *Ctenocephalides felis* (Bouche 1935)	Cats, etc.
1 *Pulex irritans* (Linn 1758)	Dogs, man, etc.

Disappearance of the infection from fleas.—Most of the fleas that were found to excrete virulent *P. pestis* in their feces after exposure to infection continued to harbor the organisms in their gastrointestinal tracts until death. Some fleas, however, ceased to excrete organisms and the inoculation of their dead bodies failed to produce the disease in guinea pigs. This tendency of fleas to become free from infection varied to some extent for the different species of fleas, as only 4 percent of *X. cheopis* became uninfected, as compared to 12 to 19 percent of a number of other species.

Transmission of plague by fleas.—A total of 81 fleas, 70 females and 11 males, transmitted plague to 165 guinea pigs during these experiments. Individual fleas of several species infected more than one guinea pig and one, a male wild rodent flea, transmitted the disease to 11 animals. In proportion to the number of fleas infected, equal numbers of the 2 domestic rat species acted as vectors, and on this basis some of the wild rodent species were equally as effective vectors. Some species of fleas, particularly those with vestigial eyes and the rabbit and cat fleas, did not survive long enough in the laboratory to determine whether or not they were capable of being vectors. Of all the fleas tested, only one species, *M. telchinum* from *Microtus* (native mice), could be definitely considered as incapable of transmitting plague or at least very feeble vectors, because not one of 74 plague-infected fleas of this species transmitted the infection to guinea pigs.

These fleas lived as long in the laboratory as species which infected guinea pigs.

The following table lists the number of each species of fleas that transmitted plague, with their usual hosts and the number of guinea pigs to which they transmitted the disease.

Flea	*Host*
28 *X. cheopis* infected 59 guinea pigs	Domestic rats.
10 *N. fasciatus* infected 17 guinea pigs	Do.
2 *D. montanus* infected 3 guinea pigs	Ground squirrels.
1 *H. anomalus* infected 1 guinea pig	Do.
6 *T. pandorae* infected 15 guinea pigs	Do.
14 *O. labis* infected 35 guinea pigs	Do.
2 *O. rupestris* infected 6 guinea pigs	Do.
4 *T. francisi* infected 8 guinea pigs	Do.
3 *T. arizonensis* infected 5 guinea pigs	Do.
1 *O. tuberculatus* infected 1 guinea pig	Do.
3 *O. hirsutus* infected 4 guinea pigs	Prairie dogs.
1 *T. acamantis* infected 1 guinea pig	Marmots.
1 *T. howelli* infected 2 guinea pigs	Do.
2 *M. eumolpi* infected 4 guinea pigs	Chipmunks.
3 *O. sexdentatus* infected 4 guinea pigs	Native rats.

Period during which fleas were infectious.—The average length of life of fleas after they first transmitted plague was 3.2 days. For fleas of different species there was not much variation from this average. Nearly half of the fleas which transmitted plague were dead in less than 48 hours following their first infectious bite. A few fleas survived for over a week. The bites of a number of fleas that lived several days after transmitting the disease to one guinea pig were not infectious to any other animals.

Extrinsic incubation of plague in fleas.—It was found that a certain period must elapse for the extrinsic incubation of the infection in the gastrointestinal tracts of fleas before the bites were infectious. During these experiments this interval varied from 5 to 130 days. It varied both in the case of fleas of the same species as well as in those of different species. For example, the extrinsic incubation in *X. cheopis* varied from 5 to 31 days, with an average of 21 days, at a mean temperature of 66° F., while in the case of *N. fasciatus* this period varied from 6 to 116 days, with an average of 41 days. The extrinsic incubation of the infection in wild rodent fleas was very similar to that of *N. fasciatus*, with the average of some species being somewhat less than for the domestic rat fleas.

The average length of the extrinsic incubation period of plague in *X. cheopis* which were kept in an incubator at 72° to 80° F. was 15 days, or 6 days less than in the case of this species kept at a mean temperature of 66° F. Therefore, it would seem that an increase in temperature may reduce the length of the extrinsic incubation period of plague in these fleas.

Other factors being about equal, the difference in the length of the extrinsic incubation period of plague in different species of fleas must be considered as being of the greatest importance in determining their efficiency as vectors. Certainly the time that elapses from infection until transmission will determine the rapidity with which any species of fleas will spread the infection among their rodent hosts. Furthermore, the longer the extrinsic incubation period, the less likelihood there is of the fleas surviving the conditions of their environment to transmit the infection.

Length of life of plague-infected fleas.—These experiments demonstrated that fleas of many species may harbor virulent plague organisms in their gastrointestinal tracts for long periods without ill effects. The domestic rat fleas, *X. cheopis*, died in a shorter time after infection than any other species which thrived well in the laboratory. The average length of life of most other species of fleas was from 1 to 3 months, with some fleas surviving for maximum periods of 3 to over 5 months. The long life of many of the wild rodent fleas which harbored *P. pestis* explains the manner by which plague may be carried over from one active season to another in hibernating animals.

Plague-infected *X. cheopis* kept at a mean temperature of 66° F. survived for an average of 17 days, while those kept in an incubator at 72° to 80° F. lived an average of only 12 days, thus indicating that increased temperatures shorten the life of plague-infected fleas of this species.

Mechanism of plague transmission by fleas.—Throughout these experiments plague transmission by fleas was due to regurgitation of blood from the esophagus as described by Bacot and Martin, for mass formations which obstructed the flow of ingested blood to the stomach were observed in all of the parasites that transmitted the disease. In a number of instances regurgitated blood was seen to exude from the mouth parts of fleas upon their withdrawal from the skin.

Most normal fleas seldom fed longer than 4 minutes at one time and would rarely attempt to feed more frequently than once in 24 to 72 hours, depending on the species and temperature. As blood cannot enter the stomachs of fleas with blocked passages and they eventually die of starvation, the efforts of such fleas to feed were usually characteristic in that they would remain attached for abnormally long periods at one site or would shift from one place to another one or more times before temporarily ceasing their efforts to satisfy their hunger. Furthermore, fleas with blocked passages would generally try to feed as often as every hour or two during the day if placed in contact with guinea pigs. In some cases abnormal feedings such as those just described resulted from a partial obstruction permitting some blood to enter the stomach, or a temporary obstruction that would disappear during later efforts to feed. Regardless of the manner

in which fleas fed, a positive diagnosis of complete blockage could be made only by microscopic examination.

A few fleas transmitted plague when the duration of the infectious bite was less than 2 minutes, but as a general rule the more persistent the efforts of blocked fleas to feed, the greater was the likelihood of the bites being infectious.

However, a great many fleas that fed in a typical manner indicating blockage failed to transmit plague because regurgitation did not occur or because organisms were not carried into the wound. There is also a possibility that in some instances the organisms became so attenuated that they were not pathogenic.

Development of plague infection in fleas.—Microscopical studies were made of the gastrointestinal tracts of normal and plague-infected fleas by mounting both dead and live parasites in a drop of water under a cover glass. The development of plague masses was followed by examining live fleas at different intervals. Obstructing masses were usually clearly visible in both dead and live insects, but the outlines of the masses during their earlier stages could not be definitely distinguished except in stomachs which were distended with clear red blood. This necessitated the making of examinations immediately after fleas had fed.

Within a few days after the ingestion of *P. pestis*, dark-brownish masses were observed to form either in the proventriculi or in the stomachs of the infected fleas. Those originating in the proventriculi developed to the point where they caused obstruction within a few days to 3 weeks after infection of the fleas. These masses often invaded the esophagus before complete blockage occurred. In some instances blood passed into the stomach when the masses had caused considerable dilatation of the proventriculus. The mass formations which developed primarily in the stomachs varied greatly in size, number, and shape. During the early stages there were usually a number of small granular masses formed in the stomach. These masses tended to form in groups that were joined together by a fine weblike membrane, and they also coalesced, forming one large mass or two or more medium-sized ones. In some fleas the masses became so large that they nearly filled the stomach within a month or two after infection of the fleas. In other cases the masses were relatively small after 3 or 4 months. Blockage from a mass formed in the stomach did not occur until it invaded the narrow tubular opening between the proventriculus and stomach, or, more commonly, not until it had involved the proventriculus. This forward extension of the stomach masses with the development of obstruction appeared to be more or less accidental and occurred sometimes within a month or sometimes not for several months after infection of the fleas. The

masses in the stomach moved about as foreign bodies and had no connection with the stomach walls.

During this study it was observed that plague masses originated primarily in the proventriculi of *X. cheopis* more frequently than in the case of all other species of fleas tested, thus accounting for the shorter extrinsic incubation period of the infection in *X. cheopis*.

Typical obstructing masses were seen in a great many fleas of nearly all species that did not transmit plague in the laboratory.

Small plague masses were composed almost entirely of bipolar cocco-bacilli, while the larger and older masses had a large central core of amorphous, cohesive, dark-brown material, and the organisms were limited to a narrow outer zone surrounding the amorphous core. Bipolar organisms were also present in smears made of any fluid present in the stomachs containing masses.

In a number of instances, small mass formations exactly like those present in the stomach were seen in the intestines and rectal pouch, which would indicate that complete discharge of small masses may take place at times and fleas thus may become free from infection.

Infectiousness of flea feces.—By inoculating guinea pigs subcutaneously with 18-hour bouillon cultures of the feces deposited by fleas in test tubes, from 80 to 90 percent of the test animals were infected in the case of most species of fleas if they harbored *P. pestis* in the gastrointestinal tracts. When inoculations were made at intervals of a few days, two consecutive negative reactions were sufficient to prove that fleas which had been exposed to infection did not harbor plague organisms and that fleas which had previously been found to excrete organisms had become free from infection. Such tests of the feces present in test tubes at the time fleas died gave a slightly greater percentage of positive results than the inoculation of the bodies of the parasites. It was found that plague organisms might survive in dried feces as long as 5 weeks at room temperature.

Thirty experimental attempts were made to infect guinea pigs by rubbing into the scarified skin both freshly deposited and dry feces of fleas which were known to have been plague infected without the development of the disease in a single animal. Therefore it would seem unlikely that plague is contracted naturally to any extent through the medium of infected feces deposited on the skin.

PLAGUE INFECTION OF GUINEA PIGS BY FLEAS

Reaction at the site of the infectious bite.—Characteristic skin reactions developed at the site of infectious flea bites in about 90 percent of infected guinea pigs. These lesions first appeared as small macules, sometimes as early as 18 hours after the bite, and formed papules in about 24 hours. A small gray granule formed in the apex of the

papule that sloughed out, forming an ulcer if the animals lived long enough. During the papular stage the lymph glands on the same side became greatly enlarged.

Virulence of flea-transmitted infection.—All but 4 guinea pigs infected by fleas died from the infection, some in 3 and 4 days and over half of them in 7 days or less. The virulence of the infection in guinea pigs was not affected by the time that elasped from infection of the fleas until they transmitted the disease.

WILD RODENT INFESTATION WITH DIFFERENT SPECIES OF FLEAS WHICH TRANSMITTED PLAGUE IN THE LABORATORY

Fleas which transmitted plague in the laboratory included nearly all of the most prevalent species found on wild rodents which have been implicated in the spread of the infection in all regions where plague foci have been discovered, and also 2 species whose natural hosts have not yet been found to be involved in the dissemination of the disease.

In the following summary are listed the different wild rodents which were found to be infested with fleas that acted as laboratory vectors of plague, with the species of fleas indicated for each kind of rodent, and with notation on the occurrence of plague among the different animals. Many of these wild rodents harbored other species of fleas which are not mentioned because they have not been proved capable of being vectors.

GROUND SQUIRRELS

Citellus beecheyi are ground squirrels among which plague has existed for many years in California, and they act as natural hosts for *Diamanus montanus* and *Hoplopsyllus anomalus.*

Citellus grammurus, or rock squirrels, have been implicated in plague outbreaks in central Utah and western New Mexico. They also act as natural hosts for *D. montanus* and *H. anomalus.*

Citellus columbianus have been found plague infected in Wallowa County, Oregon, where they are infested with *Thrassis pandorae* and *Opisocrostis tuberculatus.*

Citellus oregonus have been involved in plague epizootics in northern California, eastern Oregon, and northern Nevada. They act as hosts for *Thrassis francisi, Thrassis pandorae*, and *Opisocrostis tuberculatus* in these regions.

Citellus townsendi have suffered from plague epizootics in eastern Washington where they are infested with *Opisocrostis tuberculatus* besides two other species of fleas.

Citellus richardsoni have been found plague infected in southwestern Montana, where they harbor *Oropsylla rupestris, Thrassis pandorae, Opisocrostis labis*, and *Opisocrostis tuberculatus.*

Citellus armatus and *Citellus elegans* have overlapping ranges in southwestern Montana, eastern Idaho, southwestern Wyoming, and northern Utah, where many infected animals of each species have been discovered. They act as hosts in these regions for *Oropsylla rupestris, Thrassis pandorae, Opisocrostis labis,* and *Opisocrostis tuberculatus.*

Callospermophilus are the mantled ground squirrels found in mountainous areas. They have been found plague infected only in the Sierra Nevada Mountains of California where the most prevalent fleas present on them were *Diamanus montanus* whose natural hosts are *Citellus beecheyi.*

Citellus mollis act as natural hosts for *Thrassis francisi* which transmitted plague in the laboratory, but no evidence of infection has been discovered among their natural hosts.

Ammospermophilus leucurus, or desert antelope ground squirrels, and other desert squirrels are normal hosts of *Thrassis arizonensis* that acted as laboratory vectors and yet their hosts have not been found to be involved in the spread of plague.

PRAIRIE DOGS

Cynomys parvidens have been found plague infected in south central Utah where they were infested with *Opisocrostis hirsutus, Hoplopsyllus anomalus,* and *Thrassis francisi.*

Cynomys leucurus have been found to harbor infected fleas in southwestern Wyoming, where their fleas included *Opisocrostis hirsutus, Thrassis pandorae, Opisocrostis labis,* and *Opisocrostis tuberculatus.*

Cynomys gunnisoni zuniensis have been found to suffer from decimating epizootics of plague in Catron County, N. Mex., and in eastern Arizona. In Catron County, N. Mex., *Opisocrostis hirsutus* was the only parasite found on prairie dogs, while in Arizona other species of fleas were present.

MARMOTS

Marmota flaviventris have been demonstrated as being involved in the spread of plague by three positive inoculations of parasites and one of tissue from a sick animal in three different regions where plague was known to involve ground squirrels. These rodents act as the natural hosts for *Thrassis (acamantis) acamantis* and *Thrassis (acamantis) howelli.*

CHIPMUNKS

Eutamias, or western chipmunks, have been found plague infected only in areas of the Sierra Nevada Mountains where the infection involved other rodents as well. However, *Monopsyllus eumolpi* are found on chipmunks throughout the West.

NATIVE RATS

Neotoma, or wood rats, have been definitely implicated in the dissemination of plague in arid regions of southern Nevada and southern Utah and these rodents are infested with *Orchopeas sexdentatus* throughout the Western States.

SUMMARY

Fleas of 31 species were found to excrete virulent *P. pestis* in their feces after having fed on plague-infected guinea pigs and most of these fleas continued to harbor the organisms until they died. A total of 81 individual fleas, comprising 2 species from domestic rats and 13 species from wild rodents, transmitted plague by their bites to 165 guinea pigs after an extrinsic incubation period of the infection in the parasites which varied from 5 to 130 days. Species of wild rodent fleas which transmitted plague in the laboratory included the most prevalent species found infesting the different kinds of wild rodents among which plague has been demonstrated to exist in the far Western States.

Part III. Demonstration of Plague Infection by Inoculation of Parasites

Adoption of parasite inoculations as a routine procedure.—It has been known for many years that laboratory animals may be infected with plague when inoculated with the bodies of plague-infected fleas, but the use of parasite inoculations has not been adopted as a routine measure for demonstrating the existence of plague among rodent hosts. In 1936, following the demonstration of plague infection of fleas collected from ground squirrels in northern Nevada, the Public Health Service adopted the use of parasite inoculations, which included fleas, lice, and ticks as a routine procedure in surveys being conducted to locate foci of wild rodent plague.

Choice of a pulicide for plague surveys.—It was accidently discovered that fleas infected with plague in the laboratory were less likely to be infectious to inoculated guinea pigs when the parasites were killed with chloroform than when they died naturally. Following this observation, experiments were undertaken to test the effects of chloroform, ether, and hydrocyanic acid gas on cultures of *P. pestis*, as a result of which it was found that chloroform and ether in saturated atmospheres were capable of destroying the organisms and that the bacteria were attenuated by exposures of over 15 minutes to chloroform, while hydrocyanic acid gas caused only slight and variable reduction in virulence. Therefore, the cyanide gas was substituted for chloroform as a pulicide for killing parasites before attempting to collect them from their hosts in the field. Since this substitution was made, parasites obtained in areas where plague was present have given a greater percentage of positive reactions upon inoculation than during the time when chloroform was employed as a pulicide.

Preservation of P. pestis *in fleas.*—It was demonstrated in the laboratory that *P. pestis* harbored by dead plague-infected fleas might survive and retain their virulence for several months when stored in a refrigerator, and that a temperature of 98° F. destroyed the infectiousness of such fleas in 7 days. However, it has not been found necessary to refrigerate parasites in conducting field investigations provided they are shipped to the laboratory daily as collected.

Secondary infection following flea inoculations.—The inoculation tests of parasites, being an unsterile procedure, has at times produced secondary infections which obscured all evidence of the possible presence of *P. pestis* in the inoculated material. Of a number of different solutions tested in the laboratory, 2 percent salt solution proved to be the best medium for inhibiting the growth of secondary bacteria and for preventing the putrefaction of fleas without a deleterious action on *P. pestis* during storage of the insects, and this solution has been employed for over 2 years in shipping parasites from the field to the laboratory.

Inoculation of parasites.—Upon arrival of parasite specimens at the laboratory, the fleas, lice, and ticks are separated, counted, emulsified in physiological salt solution, and inoculated subcutaneously into guinea pigs. If a specimen contains a great many fleas they are usually divided into lots of 50 for inoculation. By dividing the fleas for the inoculation tests it was found possible to gain some idea of the number of infected fleas among the parasites collected from a group of animals.

During the past 3 years 4,161 inoculation tests were made of 212,000 parasites, of which nearly 200,000 were fleas. Plague infection of the test animals followed 96 pooled inoculations of fleas, 6 inoculations of lice, and 2 inoculations of ticks. There were a great many instances in which flea infection was demonstrated, while lice and ticks taken from the same groups of animal hosts were found not to harbor plague organisms. On the other hand, one inoculation of ticks and one of lice caused plague infection of the test animals when the fleas which were obtained from the same hosts were not found to be infectious.

Diagnostic value of flea inoculation tests.—In determining the existence of plague among wild rodents the inoculation of fleas has proved to be a much more sensitive test than dependence upon the discovery of plague-infected animals as indicated by the fact that since the flea tests were adopted plague has been demonstrated 96 times by this means and only 56 times by the inoculation of animal tissues. Even in areas where severe epizootics were in progress and it was possible to find dead plague-infected rodents, flea inoculations gave a greater number of positive results than inoculations of tissue. Plague-infected fleas have been obtained in 8 areas where infected animals have not yet been encountered, and, furthermore, the evidence

of plague being present among certain species of wild rodents has depended entirely upon collecting infected fleas from them. Had no effort been made to find infected animals during these investigations the results would have been practically the same, but if flea inoculation tests had not been used, many foci of infection would not have been discovered.

Comparison of the factors involved in parasite and tissue tests.—In comparing the value of parasite inoculations with animal tissue tests as a means for detecting plague, the following factors should be considered:

1. Parasites do not require refrigeration during shipment.
2. Persons engaged in collecting parasites for inoculation do not require the training necessary to detect macroscopic lesions of plague.
3. Infected fleas are likely to be obtained from animals during the early inapparent stages of the disease and from those having lesions that escape notice at autopsy.
4. Experience has demonstrated that infected fleas can be secured from rodents after epizootics subside and during enzootics when it is practically impossible to find infected animals.
5. As fleas may harbor *P. pestis* for weeks and months before their bites are infectious, it is possible for healthy animals to be infested with plague-infected fleas.
6. Even one infected flea in any lot tested will not escape inoculation while in pooled inoculations of tissue that portion that is infected may not be used in the fraction inoculated.

Use of flea inoculations during urban outbreaks.—During urban campaigns to control plague outbreaks, parasite inoculations would probably be of great value for locating infected foci during the seasonal quiescence of domestic rat epizootics and for determining when the rat infection had ended.

Summary.—During the past 3 years it has been definitely established that the inoculation of guinea pigs with parasites, particularly fleas, collected from wild rodents is preferable to depending upon the discovery of plague-infected animals as a means for determining the existence of foci of wild rodent infection.

OBSERVATIONS ON AN INFECTIOUS AGENT FROM *AMBLYOMMA MACULATUM*[1]

By R. R. Parker, *Director, Rocky Mountain Laboratory*, Glen M. Kohls, *Assistant Entomologist, United States Public Health Service*, George W. Cox, *Executive Officer, Texas State Department of Public Health*, and Gordon E. Davis, *Bacteriologist, United States Public Health Service*

During the late summer of 1937, two strains of an infectious agent pathogenic for guinea pigs were isolated from ticks of the species *Amblyomma maculatum* Koch, collected near Cleveland, Liberty County, Texas. These ticks were tested incident to a survey of the local tick population for the possible presence of agents of human disease. The survey was undertaken jointly by the Rocky Mountain Laboratory of the National Institute of Health and the Texas State Department of Health following the local occurrence of illnesses diagnosed as Rocky Mountain spotted fever. None of the other ticks tested show conclusive evidence of the occurrence of pathogenic agents: 123 *Dermacentor variabilis*, 4,064 *Amblyomma americanum*, and 33 *Rhipicephalus sanguineus*.

The two strains of this infectious agent were isolated from groups of 19 and 28 *A. maculatum*, respectively, collected from cows. One strain was not maintained beyond the first transfer. The data regarding recovery of the other strain are as follows: The 19 ticks concerned were triturated in 5 cc. of physiological saline and 2 guinea pigs each received 2 cc. of the resultant suspension, one subcutaneously, the other intraperitoneally. The former showed low fever on the first, second, fourth, and eighteenth days and was immune to the homologous agent injected on the twenty-second day. The latter was febrile on the first, fourth, and fifth days. On the fifth day there was a slight scrotal edema and reddening and the animal was sacrificed. The spleen was enlarged 3 times, the parietal and visceral tunicae were adherent toward the anterior poles of the testes, and the latter were injected. Transfer was made to 8 guinea pigs intraperitoneally, 6 receiving 1 cc. each of ground spleen tissue, and two 2 cc. each of testicular washings (tunica exudate in physiological salt solution). The spleen-injected animals remained afebrile and were later immune to a western Montana strain of Rocky Mountain spotted fever virus. Both guinea pigs that received testicular washings became febrile and had swollen, reddened scrota. They were sacrificed on the sixth and ninth days, respectively, and showed the same extensive involvement of the genital tissues as did the sacrificed tick-injected guinea pig.

[1] Contribution from the Rocky Mountain Laboratory, Division of Infectious Diseases, National Institute of Health.

Transfers were made from both, 12 guinea pigs receiving testicular washings and 4 brain tissue. All of the former became frankly infected, with findings as described above; all the latter remained afebrile, and were later found to be susceptible to a known strain of boutonneuse fever virus.

Two strain lines were started from the former group and have subsequently been maintained by testicular washings transferred intraperitoneally from animals sacrificed usually on the second day of fever. Frequent broth and agar cultures of heart blood of passage guinea pigs have consistently been bacteriologically negative.

This infection, as thus far observed in over 1,500 passage and experimental male guinea pigs, has exhibited the following characters. Usually there is fever and edema and reddening of the scrotum, but occasionally animals are afebrile either with or without external scrotal lesions. The scrotal discoloration is bright, like that of endemic typhus or boutonneuse fever, and seldom becomes dusky as is usual in guinea pigs infected with *Dermacentor andersoni* strains of Rocky Mountain spotted fever. The incubation period is usually from 3 to 6 days, rarely more or less, and is most often 4 or 5. The period of fever ranges from 1 to 4 days, and the maximum temperature from 39.8° C. to 41.0° C., but it is commonly 40.6° C. or lower. It seldom exceeds 40.0° C. if the febrile period is only 1 or 2 days. The scrotal edema and reddening, which varies from very slight to quite marked, generally appears on the first or second day of fever, is rarely delayed till the third, and lasts from 1 to 8 days. It may persist from 1 to 5 days after the temperature has returned to normal. The testes may become immovable within the scrotal sac, but frequently do not. Animals with typical scrotal involvement, when sacrificed on the sixth to ninth days, show a spleen 1.5 to 3 times enlarged with the malpighian corpuscles distinct. The tunica vaginalis is slightly to deeply injected, usually with exudate. The testes occasionally become hemorrhagic, but rarely the polar fat. The visceral and parietal tunicae may be definitely adherent, and the adhesion at times extends well forward and may even involve the entire testis. Sometimes the latter is completely covered by organized exudate.

With continued guinea pig passage the agent has apparently become less virulent. For several months, passage and experimental animals have seldom had more than 1 or 2 days of low fever, and infection has frequently been inapparent. The involvement of the genital tissues has become much less marked.

Thus far it has proved impossible to maintain the infection in passage guinea pigs by any other inoculum than testicular washings. As thus maintained the infection in guinea pigs is definitely mild. There have been no fatalities and infected animals do not appear ill.

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The causative agent is rickettsia-like and is present sparsely in smears of tunica exudate. Its morphology is more comparable to that of rickettsiae of the Rocky Mountain spotted fever group than to that of those of the typhus group. It has been cultivated in the embryonic tissues of developing chicks by Associate Bacteriologist Herald R. Cox of the Rocky Mountain Laboratory.

The relationship of this infection to several known rickettsial infections has been studied and the results of numerous cross immunity and other tests suggest some degree of relationship to boutonneuse fever, Rocky Mountain spotted fever, and endemic typhus. There is perfect reciprocal cross immunity between this disease and both Rocky Mountain spotted fever and boutonneuse fever (several strains of both have been used), and there is usually at least partial cross immunity with endemic typhus. The temperature curve differs from that of each of these diseases in that it is shorter, the temperature is lower, and the highest fever has consistently been on the first or second day of the febrile period. Rocky Mountain spotted fever vaccine confers, at most, a very slight degree of protection against the *maculatum* agent. Repeated attempts to recover the agent from the brain of acutely ill or recovered guinea pigs, as can be done in endemic typhus, have all given negative results.

SUMMARY

A rickettsia-like infectious agent mildly pathogenic for guinea pigs has been recovered from *Amblyomma maculatum* collected near Cleveland, Texas. As observed in male guinea pigs, there is usually a characteristic temperature curve and edema and reddening of the scrotum, but infection is sometimes inapparent. There is complete cross immunity between this infection and both Rocky Mountain spotted fever and boutonneuse fever, but with endemic typhus the degree of cross immunity is less consistent. However, it agrees with none of these diseases in all particulars.

REPORT ON MARKET-MILK SUPPLIES OF CERTAIN URBAN COMMUNITIES

Compliance of the Market-Milk Supplies of Certain Urban Communities With the Grade A Pasteurized and Grade A Raw Milk Requirements of the Public Health Service Milk Ordinance and Code, as Shown by Compliance (Not Safety) Ratings of 90 Percent or More Reported by the State Milk-Sanitation Authorities During the Period July 1, 1937, to June 30, 1939

The accompanying list gives the twelfth semiannual revision of the list of certain urban communities in which the pasteurized market milk is both produced and pasteurized in accordance with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code and in which the raw market milk sold to the final consumer is produced in accordance with the Grade A raw milk requirements of said ordinance and code, as shown by ratings of 90 percent or more reported by State milk-sanitation authorities.

These ratings are not a complete measure of safety but represent the degree of compliance with the Grade A requirements of the Public Health Service Milk Ordinance and Code. Safety estimates should also take into account the percentage of milk pasteurized, which is given in the following tables.

The primary reason for publishing such lists from time to time is to encourage the communities of the United States to attain and maintain a high level of excellence in the public health control of milk supplies

It is emphasized that the Public Health Service does not intend to imply that only those communities on the list are provided with high-grade milk supplies. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk-sanitation authority. In other cases the ratings which have been determined are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list, nor any reasonable local benefit to be derived therefrom.

The rules under which a community is included in this list are as follows:

(1) All ratings must have been determined by the State milk-sanitation authority in accordance with the Public Health Service rat'ng method, based upon the Grade A pasteurized milk and the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

(2) No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more.

Communities in which only raw milk is sold will be included if the raw milk ratings are 90 percent or more.

(3) The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old.

(4) The Public Health Service will make occasional surprise check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such surprise check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such surprise check rating is less than 85 percent, the city will be removed from the list immediately.

Communities are urgently advised to bring their ordinances up to date at least every 5 years, since ratings will be made on the basis of later editions if those adopted locally are more than 5 years old.

Communities which are not now on the list and desire to be rated should request the State milk-sanitation authority to determine their ratings and, if necessary, should improve their status sufficiently to merit inclusion in the list.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

Communities which have not adopted the Public Health Service Milk Ordinance may wish to give thoughtful consideration to the advisability of doing so. It is obviously easier to satisfy the requirements upon which the rating method is based if these are included in the local legislation.

Communities which are enforcing the Public Health Service Milk Ordinance, but which have not yet been admitted to the list, should determine whether this has been the result of failure to enforce the ordinance strictly or failure to bring the ordinance up to date.

State milk-sanitation authorities which are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small, as in most States one milk specialist is sufficient for the work.

The inclusion of a community in this list means that the pasteurized milk sold in the community, if any, is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A pasteurized milk is 90 percent or more and that, similarly, the raw milk sold in the community, if any, so nearly meets the requirements that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A raw milk is 90 percent or more. However, high-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. To secure

this added protection, those who are dependent on raw milk can pasteurize the milk at home in the following simple manner: Heat the milk over a hot flame to 155° F., stirring constantly; then immediately place the vessel in cold water and continue stirring until cool.

TABLE 1.—*Communities in which all market milk is pasteurized. In these communities market milk complies with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized milk ratings of 90 percent or more* [1]

Community	Percentage of milk pasteurized	Date of rating	Community	Percentage of milk pasteurized	Date of rating
ILLINOIS			MISSOURI		
Elgin	100	Dec. 14, 1938	St. Louis	100	June 1938
Evanston	100	May 10, 1938			
Glencoe	100	May 13, 1938	NORTH CAROLINA		
Highland Park	100	Do.			
Kenilworth	100	Do.	Andrews	100	Sept. 26, 1938
Lake Bluff	100	Do.	Clinton	100	July 27, 1938
Lake Forest	100	Do.	Draper	100	Aug. 17, 1938
Waukegan	100	May 16, 1938	Fort Bragg	100	July 27, 1938
Winnetka	100	May 13, 1938	Tarboro	100	Nov. 1, 1938
MINNESOTA					
Albert Lea	100	Sept. 29, 1938			
Rochester	100	October, 1938			
Winona	100	Aug. 12, 1938			

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Percentage of milk pasteurized	Date of rating	Community	Percentage of milk pasteurized	Date of rating
ALABAMA			ILLINOIS		
Dothan	49	June 21, 1938	Chicago	99.9	May 20, 1939
Huntsville	80	Dec. 7, 1938	Decatur	87	Jan. 28, 1939
Montgomery	27	Mar. 15, 1939	KANSAS		
ARKANSAS			Fort Scott	46	June 1939
El Dorado	40	June 1938	Kansas City	51	December 1938
Fayetteville	59	May 1939			
Fort Smith	38	June 1939	Lawrence	61	January 1938
Jonesboro	37	May 1939	Leavenworth	77	December 1938
Little Rock	44	October 1938			
Pine Bluff	28	June 1939	Ottawa	13	January 1938.
Texarkana	85	Sept. 1938	Salina	58	Do.
			Topeka	48	December 1937
FLORIDA			Wichita	69	November 1937
Miami Beach	93	May 12, 1938			
Pensacola	20	June 9, 1938	KENTUCKY		
GEORGIA			Glasgow	68	June 27, 1939
Americus	13	June 21, 1939	Louisville	97	July 1938

See footnote at end of table.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more*—Continued

NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Percentage of milk pasteurized	Date of rating
MINNESOTA		
Austin	77	May 19, 1938
Little Falls	64	Dec. 1, 1937
MISSISSIPPI		
Greenville	58	May 25, 1939
McComb	21	Dec. 6, 1938
Tupelo	21	Jan. 6, 1939
MISSOURI		
Clayton	99.9	June 1938
Ferguson	80	Do.
Kirkwood	94	Do.
University City	99.6	Do.
Webster Groves	93	Do.
NEW MEXICO		
Albuquerque	71	Nov. 10, 1938
Deming	12	October 1937
Las Vegas	56	July 20, 1938
NORTH CAROLINA		
Asheville	67	June 23, 1938
Burlington	87	Jan. 1, 1938
Elizabethtown	65	Sept. 1, 1937
Fayetteville	49	July 27, 1938
Franklin	73	Sept. 29, 1938
Goldsboro	39	Apr 18, 1938
Greensboro	75	Oct. 1938
Hendersonville	53	Sept. 13, 1938
High Point	85	Dec. 1937
Hope Mills	64	July 27, 1938
Leaksville	53	Aug. 16, 1938
Lexington	60	Dec. 8, 1938
Mount Airy	47	Oct. 18, 1938
Pilot Mountain	54	Oct. 19, 1938
Reidsville	69	Aug. 18, 1938
Rocky Mount	50	Nov. 29, 1938
Salisbury	57	Oct. 6, 1938
Winston-Salem	61	Nov. 1938
OHIO		
Athens	84	Oct. 6, 1938
OKLAHOMA		
Ada	62	Sept. 16, 1938
Bartlesville	42	Dec. 20, 1937
Blackwell	34	May 10, 1938
Lawton	47	Feb. 22, 1939
Muskogee	70	Mar. 16, 1938
Oklahoma City	73	Mar. 29, 1939
OKLAHOMA—continued		
Okmulgee	55	Apr. 20, 1938
Tulsa	74	Apr. 1939
OREGON		
Astoria	64	June 16, 1939
Portland	80	July 2, 1938
TENNESSEE		
Clinton	75	June 9, 1938
TEXAS		
Abilene	67	Apr 25, 1939
Amarillo	73	Oct. 17, 1938
Ballinger	49	Apr. 21, 1939
Bay City	28	Mar 3, 1939
Big Spring	34	Sept 20, 1938
Corpus Christi	87	May 26, 1939
Dallas	77	Dec 10, 1938
Fort Worth	75	Feb. 25, 1939
Gainesville	63	June 30, 1939
Galveston	77	Feb. 4, 1939
Henderson	47	May 24, 1939
Lamesa	48	May 4, 1939
Nacogdoches	68	May 26, 1939
San Antonio	79	Sept. 9, 1938
Seguin	12	July 30, 1938
Sherman	43	June 17, 1939
Texarkana	26	Oct. 25, 1938
Tyler	49	Apr. 14, 1939
Waco	48	Mar. 30, 1939
UTAH		
Salt Lake City	96	Mar. 31, 1938
VIRGINIA		
Pulaski	33	July 6, 1938
South Boston	77	July 11, 1938
Williamsburg	41	May 3, 1939
WASHINGTON		
Camas	8	May 22, 1939
Vancouver	31	May 25, 1939
Walla Walla	53	Apr. 14, 1939
Yakima	67	Apr. 20, 1939
WEST VIRGINIA		
Huntington	66	June 5, 1939
WYOMING		
Casper	71	Aug. 17, 1938
Cheyenne	74	July 7, 1938

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

TABLE 8.—*Communities in which no market milk is pasteurized, but in which the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by raw milk ratings of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Date of rating
KANSAS	
Horton	January 1938
Neodesha	April 1939
MISSISSIPPI	
Canton	Oct. 17, 1938
Greenwood	Nov. 22, 1938
Hollandale	Nov. 30, 1938
Holly Springs	Jan. 4, 1939
Leland	Nov. 30, 1938
Magnolia	Dec. 6, 1938
Ocean Springs	Dec. 29, 1937
Yazoo City	Oct. 12, 1938
NEW MEXICO	
Raton	Dec. 21, 1937
NORTH CAROLINA	
Ahoskie	Oct. 20, 1938
Aulander	Nov. 8, 1938
Belhaven	Oct. 26, 1938
Bladenboro	Sept. 1, 1937
Clarkton	Do.
Colerain	Nov. 8, 1938
Edenton	Nov. 7, 1938
Elkin	Oct. 19, 1938
Fremont	Feb. 2, 1938
Kelford	Nov. 8, 1938
Lewiston	Do.
Mars Hill	Feb. 21, 1939
Mount Holly	Oct. 28, 1937
Mount Olive	Feb. 2, 1938
Murfreesboro	Oct. 20, 1938
North Wilkesboro	July 29, 1938
Powellsville	Nov. 8, 1938
NORTH CAROLINA—continued	
Roxobel	Nov. 8, 1938
Spray	Aug. 17, 1938
Tabor City	Mar. 30, 1938
Wilkesboro	July 29, 1938
Windsor	Nov. 8, 1938
Woodville	Do.
OKLAHOMA	
Hobart	Jan. 19, 1938
Kingfisher	Nov. 22, 1937
SOUTH CAROLINA	
Hartsville	Mar. 30, 1938
TENNESSEE	
Knox County	June 7, 1938
Savannah	Apr. 22, 1938
TEXAS	
Canyon	Oct. 14, 1938
Colorado	May 10, 1939
Commerce	Mar. 16, 1939
Del Rio	Apr. 20, 1939
Kermit	Sept. 12, 1938
VIRGINIA	
Boydton	Apr. 26, 1939
WEST VIRGINIA	
Grantsville	June 7, 1939

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

PUBLIC HEALTH SERVICE PUBLICATIONS

A List of Publications Issued During the Period January–June 1939

There is printed herewith a list of publications of the United States Public Health Service issued during the period January–June 1939.

The purpose of the publication of this list is to provide a complete and continuing record of Public Health Service publications, for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free public distribution.

These current lists of publications will be issued in limited numbers as separates, which will be made available for selected distribution to scientific personnel and librarians who have a special need for them and who may find it desirable to bring together in one file a complete list of Service publications.

Those publications marked with an asterisk (*) can be obtained only by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices noted.

Periodicals

*Public Health Reports (weekly), January–June, vol. 54, nos. 1 to 26, pages 1 to 1194. 5 cents a number.

*Venereal Disease Information (monthly), January–June, vol. 20, nos. 1 to 6, pages 1 to 184. 5 cents a number.

Reprints From the Public Health Reports

2019. The health of the Nation. By Thomas Parran. January 6, 1939. 7 pages.
2020. Nonindustrial injuries among male and female industrial employees. By Hugh P. Brinton. January 6, 1939. 12 pages.
2021. Undergraduate engineering training in public health and related activities in engineering colleges of the United States. By Arthur P. Miller. January 13, 1939. 7 pages.
2022. Evaluation of odor nuisance in the manufacture of kraft paper. By J. M. DallaValle and H. C. Dudley. January 13, 1939. 9 pages.
2023. Amblyomma philipi—A new tick from Texas and Mexico, with a key to known species of Amblyomma in the United States. (Acarina: Ixodidae). By R. A. Cooley and Glen M. Kohls. January 13, 1939. 4 pages; 2 plates.
2024. Basal metabolism tests on disturbed patients. By C. K. Himmelsbach and Othilia T. Mertes. January 20, 1939. 4 pages.
2025. Do case records guide the nursing service? By Mayhew Derryberry. January 20, 1939. 11 pages.
2026. Studies in chemotherapy. VIII. Some toxic effects of repeated administration of sulfanilamide and sulfanilyl sulfanilamide ("di-sulfanilamide") to rabbits and chickens. By Sanford M. Rosenthal. January 27, 1939. 12 pages.
2027. Histopathological changes in hens and rabbits following administration of sulfanilamide and sulfanilyl sulfanilamide (di-sulfanilamide). By A. A. Nelson. January 27, 1939. 21 pages; 3 plates.
2028. The protein tyrosin reaction. A biochemical diagnostic test for malaria. By H. O. Proske and Robert B. Watson. February 3, 1939. 15 pages.
2029. Chronic ulcerative cecitis in the rat. By Benjamin F. Jones and Harold L. Stewart. February 3, 1939. 4 pages.
2030. Report on market-milk supplies of certain urban communities. Compliance of the market-milk supplies of certain urban communities with the Grade A pasteurized and Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code, as shown by compliance (not safety) ratings of 90 percent or more reported by the State milk-sanitation authorities during the period January 1, 1937, to December 31, 1938. February 3, 1939. 5 pages.
2031. An epidemiological study of poliomyelitis in the District of Columbia. By C. C. Dauer. February 10, 1939. 8 pages.
2032. Mottled enamel in South Dakota. By H. Trendley Dean, Elias Elvove, and Richard F. Poston. February 10, 1939. 16 pages.
2033. The effect of artificial temperatures on stability of neoarsphenamine. By T. F. Probey and W. T. Harrison. February 10, 1939. 5 pages.

2034. The formol-gel reaction in rheumatic fever: an aid in the diagnosis of active carditis. By Mark P. Schultz and Edythe J. Rose. February 17, 1939. 16 pages.
2035. The concentration of glutathione in the erythrocytes of patients with rheumatic fever. By Mark P. Schultz. February 17, 1939. 5 pages.
2036. Public Health Service publications. A list of publications issued during the period July–December 1938. February 3, 1939. 6 pages.
2037. Studies of the acute diarrheal diseases. I. Differential culture media. By A. V. Hardy, James Watt, T. M. DeCapito, and Maxwell H. Kolodny. February 24, 1939. 14 pages.
2038. Clegg's amoeba culture method for growing Mycobacterium leprae. By Florence L. Evans. February 24, 1939. 5 pages.
2039. Glucose tolerance in rheumatic fever. By Mark P. Schultz. February 24 1939. 6 pages.
2040. Preventive clinic facilities available in 94 selected counties of the United States. By Anthony J. Borowski and Margaret Lovell Plumley. March 3, 1939. 8 pages.
2041. The catalytic potency of the blood in rheumatic fever. By Mark P. Schultz and Edythe J. Rose. March 3, 1939. 10 pages.
2042. A study of quartz-fusing operations with special reference to the measurement and control of silica fumes. By Edward C. Riley and J. M. DallaValle. March 3, 1939. 8 pages.
2043. The association between rheumatic fever and exophthalmic goiter. By Mark P. Schultz. March 10, 1939. 8 pages.
2044. Breast and lung carcinoma in "A" stock mice. By John J. Bittner. March 10, 1939. 13 pages.
2045. The complement fixation reaction of Lleras in leprosy. By Sam H. Black and Hilary Ross. March 10, 1939. 8 pages.
2046. Mouth lesions associated with dietary deficiencies in monkeys. By N. H. Topping and H. F. Fraser. March 17, 1939. 16 pages; 4 plates.
2047. Oral pathology in monkeys in various experimental dietary deficiencies. By T. H. Tomlinson, Jr. March 17, 1939. 8 pages; 3 plates.
2048. A study of experimental pertussis in the young rat. By J. W. Hornibrook and L. L. Ashburn. March 17, 1939. 6 pages; 3 plates.
2049. Disabling sickness and nonindustrial injuries among drivers and other employees of certain bus and cab companies, 1930–34, inclusive. By Hugh P. Brinton. March 24, 1939. 10 pages.
2050. Studies of sewage purification. IX. Total purification, oxidation, adsorption, and synthesis of nutrient substrates by activated sludge. By C. C. Ruchhoft, C. T. Butterfield, P. D. McNamee, and Elsie Wattie. March 24, 1939. 29 pages.
2051. Engineering problems in milk sanitation. By Leslie C. Frank. March 31, 1939. 14 pages; 2 plates.
2052. Induction of carditis by the treatment of infected guinea pigs with insulin. By Mark P. Schultz and Edythe J. Rose. March 31, 1939. 6 pages; 3 plates.
2053. Insects found on aircraft at Miami, Fla., in 1938. By E. V. Welch. April 7, 1939. 6 pages.
2054. Studies on oxyuriasis. XIX. Examinations of children in a private nursery school over an 18-month period. By Eloise B. Cram and M. O. Nolan. April 7, 1939. 8 pages.
2055. A simple device for sampling air-borne bacteria. By Alexander Hollaender and J. M. DallaValle. April 7, 1939. 4 pages; 1 plate.

2056. The antigenic and synergistic action of a toxic serum extract of hemolytic streptococci. By Mark P. Schultz and Edythe J. Rose. April 14, 1939. 12 pages.
2057. Silicosis and lead poisoning among pottery workers. Summary of report of study made in West Virginia. April 14, 1939. 4 pages.
2058. Frequency of dental services among 9,000 families, based on Nation-wide periodic canvasses 1928–31. By Selwyn D. Collins. April 21, 1939. 29 pages.
2059. The evolution of disseminated bacterial infection in guinea pigs. Influence of treatment with insulin and phloridzin. By Mark P. Schultz and Edythe J. Rose. April 21, 1939. 6 pages.
2060. Lymphocytic choriomeningitis. Report of two cases, with recovery of the virus from gray mice (Mus musculus) trapped in the two infected households. By Charles Armstrong and Lewis K. Sweet. April 28, 1939. 12 pages.
2061. Maternal mortality in rural and urban areas. By Harold F. Dorn. April 28, 1939. 8 pages.
2062. Disabling industrial morbidity, third and fourth quarters of 1938 and the entire year. By William M. Gafafer. April 28, 1939. 6 pages.
2063. The effectiveness of certain types of commercial air filters against bacteria (B. subtilis). By J. M. DallaValle and Alexander Hollaender. April 28, 1939. 6 pages.
2064. Aquatic life in waters polluted by acid mine waste. By James B. Lackey. May 5, 1939. 8 pages.
2065. Biological products. Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. May 5, 1939. 6 pages.
2066. What people ask about health. By Robert Olesen. May 12, 1939. 26 pages.
2067. Report of three cases of ariboflavinosis. By J. W. Oden, L. H. Oden, Jr., and W. H. Sebrell. May 12, 1939. 4 pages.
2068. Sylvatic plague: studies of predatory and scavenger birds in relation to its epidemiology. By William L. Jellison. May 12, 1939. 8 pages.
2069. Organized public nursing and variation of field programs in 94 selected counties. By Joseph W. Mountin and Evelyn Flook. May 19, 1939. 12 pages.
2070. Maternal services in Michigan with special reference to economic status. By Jennie C. Goddard and Carroll E. Palmer. May 19, 1939. 16 pages.
2071. Notes on the fleas of prairie dogs, with the description of a new subspecies. By William L. Jellison. May 19, 1939. 6 pages.
2072. Prevalence of poliomyelitis in the United States in 1938. By C. C. Dauer. May 26, 1939. 6 pages.
2073. Domestic water and dental caries, including certain epidemiological aspects of oral L. acidophilus. By H. Trendley Dean, Philip Jay, Francis A. Arnold, Jr., Frank J. McClure, and Elias Elvove. May 26, 1939. 26 pages.
2074. Studies of sewage purification. X. Changes in characteristics of activated sludge induced by variations in applied load. By C. C. Ruchhoft and R. S. Smith. June 2, 1939. 16 pages.
2075. A study of human sera antibodies capable of neutralizing the virus of lymphocytic choriomeningitis. By Jerald G. Wooley, Fred D. Stimpert, John F. Kessel, and Charles Armstrong. June 2, 1939. 6 pages.

2076. Acute response of guinea pigs to the inhalation of dimethyl ketone (acetone) vapor in air. By H. Specht, J. W. Miller, and P. J. Valaer. June 2, 1939. 12 pages.
2077. Analysis of 5,116 deaths reported as due to acute coronary occlusion in Philadelphia, 1933–1937. By O. F. Hedley. June 9, 1939. 42 pages.
2078. Smallpox vaccination: a comparison of vaccines and techniques. By Ralph V. Ellis and Ruth E. Boynton. June 9, 1939. 14 pages.
2079. Influence of castration on the induction of subcutaneous tumors in mice of the C_3H strain by 1:2:5:6-dibenzanthracene. By Harold L. Stewart. June 9, 1939. 6 pages.
2080. Studies on immunizing substances in pneumococci. IX. Cutaneous tests in nonimmunized and immunized individuals in relationship to serum antibody content. By Lloyd D. Felton and Perry Franklin Prather. June 16, 1939. 18 pages.
2081. Rocky Mountain spotted fever. Protective value for guinea pigs of vaccine prepared from rickettsiae cultivated in embryonic chick tissues. By Herald R. Cox. June 16, 1939. 8 pages.
2082. The preservation of lymphocytic choriomeningitis and St. Louis encephalitis viruses by freezing and drying in vacuo. By Jerald G. Wooley. June 16, 1939. 2 pages.
2083. The significance of dust counts. By J. M. DallaValle. June 23, 1939. 10 pages.
2084. Studies of the acute diarrheal diseases. II. Parasitological observations. By Bertha Kaplan Spector, A. V. Hardy, and Mary Graham Mack. June 23, 1939. 10 pages.
2085. Breast cancer in breeding and virgin "A" and "B" stock female mice and their hybrids. By John J. Bittner. June 23, 1939. 6 pages.

Supplements to the Public Health Reports

147. The notifiable diseases. Prevalence during 1937 in States. 1939. 12 pages.
148. Measles. By R. D. Wright. 1938. 6 pages.
149. Good teeth. By F. C. Cady and John W. Knutson. 1939. 6 pages.
150. What every person should know about milk. By Leslie C. Frank. 1939. 11 pages.
153. Marital status of delinquents in relationship to Rorschach test scores. By M. J. Pescor. 1939. 6 pages.

Public Health Bulletins

244. Silicosis and lead poisoning among pottery workers. By Robert H. Flinn, Waldemar C. Dreessen, Thomas I. Edwards, Edward C. Riley, J. J. Bloomfield, R. R. Sayers, John F. Cadden, and S. C. Rothman. February 1939. 178 pages; 78 figures (48 halftones; 30 line cuts).
245. Milk supplies and their control in American urban communities of over 1,000 population in 1936. By A. W. Fuchs and L. C. Frank. December 1938. 70 pages.
246. Dermatitis and coexisting fungous infections among plate printers. By Paul A. Neal and C. W. Emmonds. April 1939. 56 pages; 6 halftones.

National Institute of Health Bulletins

171. The genera Dermacentor and Otocentor (Ixodidae) in the United States, with studies in variation. By R. A. Cooley. December 1938. 89 pages; 21 plates; 9 lithographs.

Unnumbered Publications

Index to Public Health Reports, volume 53, part 2, July–December 1938. 28 pages.

National Negro Health Week program. This pamphlet is published annually, usually about the middle of March, for community leaders in an effort to suggest ways and means by which interested individuals and organizations may be organized for a concerted and effective attack upon the community's disease problems. Twenty-fifth observance, April 1–30, 1939. 12 pages.

*National Negro Health Week poster. Twenty-fifth observance. 1939. Out of print.

National Negro Health Week leaflet. Twenty-fifth observance. 1939. 2 pages.

Annual Report

*Annual Report of the Surgeon General of the United States Public Health Service for the fiscal year 1938. 184 pages. Out of print.

Reprints From Venereal Disease Information

97. Direct costs of treating syphilis and gonorrhea in New York City. By Jacob A. Goldberg. Vol. 19, September 1938. 12 pages.
98. Presidential address, American Medical Association, 1876. By J. Marion Sims. Vol. 19, October 1938. 13 pages.
99. The chance of acquiring syphilis and the frequency of its disastrous outcome. By R. A. Vonderlehr and Lida J. Usilton. Vol. 19, November 1938. 9 pages.
100. Cooperative clinical studies in the treatment of syphilis: Tabes dorsalis. By Paul A. O'Leary, Harold N. Cole, Joseph Earle Moore, John H. Stokes, Udo J. Wile, Thomas Parran, R. A. Vonderlehr, and Lida J. Usilton. Vol. 19, November 1938. 30 pages.
101. Serology of syphilis in relation to the Chicago syphilis control project. By Reuben L. Kahn. Vol. 19, December 1938. 6 pages.
102. Simple method of determining attendance and delinquency in a syphilis clinic. By R. H. Kampmeier. Vol. 19, December 1938. 4 pages.
103. Progress in venereal disease control in the States, June 30, 1938. Vol. 19, December 1938. 3 pages.
104. Effect of tuberculosis on serologic reactions for syphilis. By Thomas Parran and Kendall Emerson. Vol. 20, January 1939. 5 pages.
105. Serologic reactions for syphilis in blood-transfusion donors. By A. E. Keller and W. S. Leathers. Vol. 20, January 1939. 4 pages.
106. Sulfanilamide therapy in gonorrhea. By John E. Dees and Hugh H. Young. Vol. 20, February 1939. 8 pages.
107. Making gold sol for cerebrospinal fluid tests. By Benjamin S. Levine. Vol. 20, February 1939. 2 pages.
108. Hospital, clinic, and laboratory costs of syphilis in Buffalo, N. Y., with a comparison of similar costs in Baltimore, Md. By W. A. Brumfield, Jr. Vol. 20, March 1939. 12 pages.
109. The role of the physician in the control of syphilis. By C. W. Barnett. Vol. 20, March 1939. 5 pages.
110. Cost and loss from syphilitic blindness in the United States. By C. E. Rice. Vol. 20, April 1939. 5 pages.

Venereal Disease Folder

3. You can end this sorrow. 4 pages.

Supplements to Venereal Disease Information

8. The gonococcus and gonococcal infections. 78 pages.
9. The serodiagnosis of syphilis. 224 pages.

DEATHS DURING WEEK ENDED JULY 22, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 22, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7, 198	7, 282
Average for 3 prior years	[1] 7, 488	
Total deaths, first 29 weeks of year	251, 432	244, 236
Deaths under 1 year of age	454	[1] 531
Average for 3 prior years	[1] 552	
Deaths under 1 year of age, first 29 weeks of year	14, 950	15, 400
Data from industrial insurance companies:		
Policies in force	66, 974, 508	69, 062, 540
Number of death claims	10, 937	10, 681
Death claims per 1,000 policies in force, annual rate	8. 5	8. 1
Death claims per 1,000 policies, first 29 weeks of year, annual rate	10. 8	9. 5

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (.....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 29, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934-38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934-38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	1	0	.....	.....	12	.....	139	23	16	16
New Hampshire	0	0	1	0	.....	.....	.....	.....	61	6	1	2
Vermont	0	0	0	0	.....	.....	.....	.....	509	38	12	7
Massachusetts	1	1	2	6	.....	.....	.....	.....	125	106	86	94
Rhode Island	0	0	0	1	.....	.....	.....	.....	206	27	4	5
Connecticut	6	2	3	3	.....	.....	4	.....	137	46	18	32
MID. ATL.												
New York	3	8	16	26	[1] 2	[1] 3	[1] 1	[1] 1	111	278	478	354
New Jersey	7	6	7	7	1	1	2	2	21	18	56	125
Pennsylvania	8	15	13	13	.....	.....	.....	.....	23	45	83	242
E. NO. CEN.												
Ohio	3	4	27	27	4	5	.....	7	15	20	106	226
Indiana	0	0	6	9	3	2	3	3	1	1	8	20
Illinois	10	16	34	22	4	6	10	6	7	10	36	161
Michigan [2]	7	7	7	8	1	1	.....	.....	77	73	226	128
Wisconsin	0	0	5	3	16	9	19	19	128	73	253	253
W. NO. CEN.												
Minnesota	0	0	0	3	2	1	1	1	37	19	64	31
Iowa	0	0	4	4	.....	.....	.....	.....	41	20	51	15
Missouri	1	1	2	6	.....	.....	27	13	1	1	8	14
North Dakota	29	4	1	0	.....	.....	8	.....	0	0	24	24
South Dakota	30	4	1	1	.....	.....	.....	.....	8	1	.....	1
Nebraska	4	1	0	1	.....	.....	.....	.....	11	3	8	5
Kansas	3	1	5	3	8	3	.....	2	36	13	15	1

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 29, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	--	--	--	--	59	3	1	1
Maryland [3]	6	2	8	8	9	3	2	1	34	11	12	12
Dist. of Col	40	5	4	2	--	--	1	--	73	9	3	5
Virginia	37	20	4	5	51	27	--	--	107	57	58	58
West Virginia	11	4	4	5	8	3	10	9	11	4	19	21
North Carolina [3]	31	21	20	13	--	--	6	1	39	27	121	62
South Carolina [3]	8	3	2	2	188	69	66	40	0	0	9	6
Georgia [3]	25	15	11	10	12	7	--	--	12	7	--	--
Florida [3]	12	4	3	6	6	2	--	--	33	11	9	1
E. SO. CEN.												
Kentucky	14	8	5	5	3	2	2	1	7	4	15	35
Tennessee	5	3	5	5	12	7	7	7	28	16	5	8
Alabama [3]	21	12	17	12	5	3	17	3	32	18	49	12
Mississippi [2]	41	16	11	9	--	--	--	--	--	--	--	--
W. SO. CEN.												
Arkansas	7	3	12	3	10	4	15	5	47	19	4	2
Louisiana [3]	15	6	14	9	15	6	6	6	7	3	4	6
Oklahoma	6	3	3	3	14	7	19	5	26	13	34	3
Texas [3]	9	11	24	21	7	9	51	26	31	37	16	34
MOUNTAIN												
Montana	0	0	0	0	--	--	--	--	150	16	17	11
Idaho	10	1	0	0	--	--	4	2	10	1	21	4
Wyoming	44	2	0	0	22	1	--	--	393	18	5	5
Colorado	77	16	6	6	24	5	--	--	67	14	21	21
New Mexico	37	3	2	3	--	--	--	--	12	1	2	17
Arizona	0	0	1	1	93	8	16	10	12	1	26	5
Utah [2]	30	3	3	0	--	--	--	--	119	12	32	7
PACIFIC												
Washington	3	1	1	1	--	--	--	--	518	168	16	31
Oregon	0	0	0	0	40	8	9	9	368	74	15	15
California [3]	13	16	18	22	6	7	12	10	145	177	275	155
Total	10	248	313	313	10	209	330	251	62	1,542	2,342	2,342
30 weeks	15	11,220	13,410	14,273	237	150,757	45,016	103,251	466	345,945	756,518	663,397

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	1	24	4	5	9
New Hampshire	0	0	0	0	0	0	0	0	0	0	1	1
Vermont	0	0	0	0	0	0	0	0	27	2	5	4
Massachusetts	0	0	2	2	2.4	2	3	8	26	22	48	47
Rhode Island	0	0	0	0	0	0	1	0	0	0	4	2
Connecticut	0	0	0	0	8	1	1	1	27	9	14	10
MID. ATL.												
New York	0.4	1	5	5	4	11	5	9	29	72	69	112
New Jersey	0	0	2	2	4	3	0	2	27	23	16	16
Pennsylvania	4	7	1	6	2	4	0	3	37	72	48	100

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 29, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0	0	0	3	2.3	3	5	6	42	55	75	75
Indiana	0	0	0	2	0	0	0	2	31	21	15	21
Illinois	0	0	3	4	5	7	3	7	42	64	75	80
Michigan [3]	1.1	1	1	1	31	29	2	6	73	69	79	76
Wisconsin	0	0	3	1	0	0	0	1	54	31	56	56
W. NO. CEN.												
Minnesota	0	0	0	0	8	4	0	0	97	50	29	25
Iowa	0	0	0	0	0	0	1	1	26	13	18	19
Missouri	1.3	1	1	0	4	3	1	1	8	6	13	18
North Dakota	0	0	0	0	7	1	0	0	15	2	9	7
South Dakota	0	0	1	0	0	0	2	0	60	8	8	6
Nebraska	0	0	0	1	8	2	0	0	11	3	1	10
Kansas	2.8	1	0	1	8	3	1	2	64	23	30	18
SO. ATL.												
Delaware	20	1	0	0	0	0	0	0	98	5	1	1
Maryland [3]	0	0	0	0	0	0	0	1	81	10	12	12
Dist. of Col.	8	1	0	1	0	0	0	0	24	3	3	5
Virginia	1.9	1	1	2	6	3	4	4	21	11	11	11
West Virginia	5	2	1	1	0	0	0	1	27	10	13	15
North Carolina [3]	0	0	1	0	12	8	2	2	22	15	14	15
South Carolina [3]	2.7	1	1	0	33	12	2	1	22	8	1	2
Georgia [3]	0	0	0	0	8	5	3	2	5	3	9	6
Florida [3]	0	0	0	0	6	2	1	1	15	5	1	1
E. SO. CEN.												
Kentucky	1.7	1	4	3	7	4	1	10	19	11	9	13
Tennessee	1.8	1	1	1	4	2	1	6	18	10	13	10
Alabama [3]	7	4	1	2	4	2	7	4	30	17	10	8
Mississippi [3]	0	0	0	0	0	0	1	2	10	4	4	5
W. SO. CEN.												
Arkansas	0	0	0	0	2.5	1	3	0	20	8	5	3
Louisiana [3]	0	0	0	0	0	0	3	1	5	2	7	5
Oklahoma	0	0	0	0	6	3	0	0	12	6	7	10
Texas [3]	4	5	1	1	8	10	2	2	6	7	20	20
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	94	10	5	5
Idaho	0	0	0	0	0	0	0	0	10	1	2	3
Wyoming	0	0	0	0	0	0	0	0	87	4	1	3
Colorado	5	1	0	0	5	1	0	0	53	11	20	18
New Mexico	0	0	0	0	0	0	0	1	99	8	8	4
Arizona	0	0	0	0	37	3	0	0	0	0	8	1
Utah [3]	0	0	0	0	10	1	0	0	40	4	11	9
PACIFIC												
Washington	0	0	0	1	0	0	0	0	28	9	13	14
Oregon	0	0	0	0	5	1	0	0	50	10	6	16
California [3]	0	0	1	5	38	46	5	21	43	52	62	67
Total	1.2	29	31	67	7	177	60	257	82	793	884	1,020
30 weeks	1.7	1,288	2,039	3,946	1.8	1,334	728	1,897	152	114,282	134,728	162,236

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 29, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934–38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases
NEW ENGLAND											
Maine	0	0	0	0	6	1	2	2	260	43	31
New Hampshire	0	0	0	0	10	1	1	0	20	2	0
Vermont	0	0	0	0	0	0	1	1	469	35	31
Massachusetts	0	0	0	0	4	3	1	3	95	81	92
Rhode Island	0	0	0	0	8	1	3	0	198	26	0
Connecticut	0	0	0	0	12	4	2	2	184	62	72
MIDDLE ATLANTIC											
New York	0	0	0	0	4	10	20	14	168	420	570
New Jersey	0	0	0	0	12	10	6	2	302	254	294
Pennsylvania	0	0	0	0	5	9	15	15	185	364	177
EAST NORTH CENTRAL											
Ohio	4	5	1	0	11	14	7	22	241	313	377
Indiana	10	7	9	2	6	4	17	15	171	115	18
Illinois	1	1	5	4	15	23	19	19	255	389	463
Michigan [2]	20	19	1	1	2	2	5	11	169	160	440
Wisconsin	2	1	0	3	0	0	2	2	373	212	337
WEST NORTH CENTRAL											
Minnesota	8	4	9	3	4	2	0	0	116	60	32
Iowa	14	7	3	5	20	10	4	2	41	20	18
Missouri	5	4	4	1	18	14	11	25	41	32	15
North Dakota	7	1	5	1	0	0	1	1	197	27	48
South Dakota	8	1	2	1	0	0	0	0	8	1	12
Nebraska	19	5	0	0	0	0	0	1	92	24	9
Kansas	0	0	0	1	17	6	2	7	45	16	65
SOUTH ATLANTIC											
Delaware	0	0	0	0	0	0	3	0	157	8	3
Maryland [2]	0	0	0	0	15	5	6	12	170	55	24
Dist. of Col	0	0	0	0	16	2	1	3	356	44	4
Virginia	0	0	0	0	43	23	39	37	178	95	93
West Virginia	0	0	0	0	54	20	10	12	35	13	28
North Carolina [3]	0	0	0	0	31	21	19	23	251	172	199
South Carolina [3]	0	0	0	0	66	24	16	16	158	58	31
Georgia [3]	0	0	0	0	65	39	46	35	17	10	56
Florida [3]	0	0	0	0	9	3	2	2	21	7	9
EAST SOUTH CENTRAL											
Kentucky	2	1	1	0	64	37	37	37	92	53	54
Tennessee	0	0	1	0	30	17	28	44	168	95	20
Alabama [3]	0	0	1	0	44	25	18	20	70	40	31
Mississippi [3]	0	0	0	0	15	6	15	16	------	------	------
WEST SOUTH CENTRAL											
Arkansas	5	2	6	0	74	30	37	37	69	28	17
Louisiana [3]	0	0	0	0	94	39	23	32	2	1	41
Oklahoma	4	2	5	0	52	26	34	33	6	3	60
Texas [3]	1	1	8	0	56	67	78	72	99	120	126
MOUNTAIN											
Montana	0	0	2	3	19	2	3	2	103	11	54
Idaho	0	0	8	2	10	1	6	0	0	0	8
Wyoming	0	0	0	0	0	0	0	0	44	2	8
Colorado	5	1	2	0	14	3	4	5	231	48	54
New Mexico	0	0	1	0	74	6	4	6	383	31	19
Arizona	12	1	1	0	37	3	0	0	37	3	16
Utah [3]	0	0	0	0	20	2	12	1	516	52	71

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended July 29, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934-38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases	1934-38, median	July 29, 1939, rate	July 29, 1939, cases	July 30, 1938, cases
PACIFIC											
Washington	6	2	29	8	3	1	3	3	46	15	50
Oregon	0	0	6	5	20	4	6	5	30	6	25
California [3]	9	11	28	1	11	14	13	11	109	133	228
Total	3	76	133	64	21	534	582	640	152	3,759	4,430
30 weeks	11	8,576	12,526	5,930	7	5,600	6,398	6,398	158	117,164	130,272

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended July 29, 1939, 90 cases as follows: North Carolina, 8; South Carolina, 3; Georgia, 31; Florida, 6; Alabama, 17, Louisiana, 1; Texas, 23; California, 1.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Aug. 5, 1939

State	Feb 26 to Mar 25	Mar 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	Week ended July 22	Week ended July 29	Week ended Aug. 5
Eastern:								
New York	-------	-------	-------	3	3	-------	-------	-------
New Jersey	-------	-------	-------	4	8	1	2	3
Pennsylvania	-------	-------	-------	6	3	1	-------	2
Delaware	-------	-------	-------	3	-------	-------	-------	-------
Maryland	-------	-------	7	13	11	5	2	11
District of Columbia	-------	-------	2	2	2	1	1	-------
Virginia	-------	-------	1	13	10	1	4	3
North Carolina	-------	-------	-------	3	13	5	2	4
Georgia	-------	-------	-------	-------	1	-------	1	-------
Central:								
Ohio	-------	-------	-------	3	2	-------	2	2
Indiana	-------	-------	-------	2	1	-------	-------	1
Illinois	-------	-------	1	1	5	2	-------	1
Tennessee	-------	-------	1	-------	3	3	1	-------
Iowa	-------	-------	1	10	9	2	-------	2
Missouri	-------	-------	-------	1	-------	-------	3	1
Western:								
Montana	[1] 2	2	8	5	1	-------	1	-------
Idaho	-------	4	7	4	5	-------	-------	-------
Wyoming	-------	3	14	16	5	3	-------	2
Colorado	-------	2	3	9	4	-------	-------	-------
Utah	-------	2	5	5	6	2	-------	-------
Washington	-------	2	3	2	-------	-------	-------	-------
Oregon	-------	9	16	7	2	-------	-------	-------

[1] 1 other case was reported in Montana as occurring in February, exact date not given

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
January 1939										
Idaho	6	8		234	1		0	70	50	4
April 1939										
Puerto Rico	27	43	1,084	8	0	2	0		0	68
May 1939										
Alaska	1	27		297	0		0		0	3
New Mexico	5	16	5	66	2	2	0	36	5	3
South Carolina	72	1,460	926	58		201	83	11	0	19
June 1939										
District of Columbia	14	1		660	1		0	21	0	2
Kansas	8	7	4	179	1	3	1	129	13	9
Massachusetts	8			3,927	5	3	3	441	0	17
Montana	1	34	2	374	0		1	27	7	5
Nevada	1			50	0	1	0	2	0	0
New Mexico	10	4	1	51	5		1	36	2	18
North Carolina	83	3	31	1,094	4	54	9	65	4	45
North Dakota	4	157		64	0		0	14	3	5
Oregon	3	67	3	299	0		1	46	6	1
South Carolina	35	684	1,301	67		188	106	11	0	48
Washington	6	5		3,445	0		0	80	3	128
Wyoming	2			186	0		0	12	7	0

January 1939

	Cases
Idaho:	
Chickenpox	103
German measles	1
Mumps	61
Septic sore throat	3
Vincent's infection	2
Whooping cough	13

April 1939

	Cases
Puerto Rico:	
Chickenpox	56
Dysentery	6
Filariasis	1
Leprosy	3
Mumps	2
Ophthalmia neonatorum	3
Puerperal septicemia	7
Tetanus	12
Tetanus, infantile	1
Whooping cough	166

May 1939

	Cases
Chickenpox:	
Alaska	46
New Mexico	116
South Carolina	138
Conjunctivitis:	
New Mexico	1
Diarrhea:	
South Carolina	1,017
Dysentery:	
New Mexico (amoebic)	2
New Mexico (bacillary)	1
New Mexico (undefined)	3
South Carolina (amoebic)	4
German measles:	
New Mexico	2
South Carolina	9

May 1939—Continued

	Cases
Hookworm disease:	
South Carolina	115
Impetigo contagiosa:	
Alaska	24
Mumps:	
Alaska	1
New Mexico	15
South Carolina	257
Ophthalmia neonatorum:	
New Mexico	2
South Carolina	5
Puerperal septicemia:	
New Mexico	3
Rabies in animals:	
New Mexico	15
South Carolina	25
Septic sore throat:	
New Mexico	18
South Carolina	3
Tetanus:	
New Mexico	1
Trachoma:	
New Mexico	2
Tularaemia:	
South Carolina	2
Typhus fever:	
South Carolina	6
Undulant fever:	
New Mexico	1
South Carolina	1
Whooping cough:	
Alaska	12
New Mexico	164
South Carolina	361

June 1939

	Cases
Chickenpox:	
District of Columbia	38
Kansas	132
Massachusetts	850

June 1939—Continued

	Cases
Chickenpox—Continued.	
Montana	93
New Mexico	31
North Carolina	228
North Dakota	52
Oregon	80
South Carolina	119
Washington	584
Wyoming	19
Colorado tick fever:	
Wyoming	2
Diarrhea:	
New Mexico	2
South Carolina	1,923
Dysentery:	
Massachusetts (amoebic)	1
Massachusetts (bacillary)	1
Montana (amoebic)	2
Montana (unspecified)	1
New Mexico (amoebic)	5
New Mexico (bacillary)	1
New Mexico (unspecified)	1
North Carolina (bacillary)	5
North Dakota (bacillary)	1
Oregon (amoebic)	1
South Carolina (amoebic)	2
Washington (amoebic)	3
Washington (bacillary)	2
Encephalitis, epidemic or lethargic:	
Kansas	4
Massachusetts	2
Montana	1
North Dakota	1
Oregon	1

Summary of monthly reports from States—Continued

June 1939—Continued

	Cases
Food poisoning:	
New Mexico	8
German measles:	
Kansas	9
Massachusetts	75
North Carolina	18
North Dakota	6
South Carolina	4
Washington	7
Wyoming	22
Hookworm disease:	
South Carolina	98
Impetigo contagiosa:	
Kansas	12
Montana	2
Oregon	16
Mumps:	
Kansas	337
Massachusetts	501
Montana	40
Nevada	6
New Mexico	6
North Dakota	1
Oregon	64
South Carolina	146
Washington	133
Wyoming	120
Ophthalmia neonatorum:	
Kansas	1
Massachusetts	88
South Carolina	8
Rabies in animals:	
New Mexico	4
Oregon	2
South Carolina	29
Washington	40

June 1939—Continued

	Cases
Rabies in man:	
Kansas	1
Rocky Mountain spotted fever:	
District of Columbia	2
Massachusetts	1
Montana	1
Nevada	1
North Carolina	9
Oregon	4
Washington	1
Wyoming	18
Scabies:	
Kansas	3
Oregon	5
Septic sore throat:	
Kansas	11
Massachusetts	7
Montana	5
New Mexico	6
North Carolina	2
North Dakota	3
Oregon	13
Washington	3
Wyoming	1
Tetanus:	
Kansas	1
Massachusetts	1
Montana	1
South Carolina	1
Trachoma:	
Kansas	2
Montana	3
North Dakota	2
Oregon	1

June 1939—Continued

	Cases
Trichinosis:	
Massachusetts	1
Tularaemia:	
New Mexico	1
South Carolina	2
Washington	1
Wyoming	1
Typhus fever:	
North Carolina	6
South Carolina	4
Undulant fever:	
Kansas	9
Massachusetts	4
North Carolina	3
North Dakota	1
Oregon	2
South Carolina	2
Washington	2
Wyoming	1
Vincent's infection:	
Kansas	8
North Dakota	8
Oregon	8
Washington	2
Whooping cough:	
District of Columbia	147
Kansas	97
Massachusetts	551
Montana	36
New Mexico	79
North Carolina	1,074
North Dakota	36
Oregon	88
South Carolina	277
Washington	67
Wyoming	4

PLAGUE INFECTION IN MONTANA, WASHINGTON, AND WYOMING

Under date of July 27, 1939, Senior Surgeon C. R. Eskey reported plague infection found in Montana, Washington, and Wyoming as follows:

IN A GROUND SQUIRREL AND IN FLEAS FROM GROUND SQUIRRELS IN BEAVERHEAD COUNTY, MONTANA

In tissue from 1 ground squirrel, *C. columbianus*, shot July 15, 9 miles west of Wisdom, and in a pool of 43 fleas from 60 ground squirrels, *C. columbianus*, shot July 15, 10 miles west of Wisdom.

IN FLEAS FROM GROUND SQUIRRELS IN SPOKANE COUNTY, WASHINGTON

In a pool of 62 fleas from 31 ground squirrels, *C. columbianus*, shot June 27, on a ranch on the south side of Turnbull Slough.

IN FLEAS FROM PRAIRIE DOGS IN SWEETWATER COUNTY, WYOMING

In a pool of 15 fleas from 36 prairie dogs, *Cyn. leucurus*, shot July 3, 2 to 4 miles south of Eden. This is stated to be the first evidence of plague infection reported in Sweetwater County.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 22, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	103	29	12	1,045	314	382	6	367	64	1,407	-------
Current week [1]	56	25	7	589	243	236	2	297	68	1,406	-------
Maine:											
Portland	0	------	0	1	1	1	0	0	0	1	20
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	8
Manchester	0	------	0	0	1	0	0	0	0	0	16
Nashua	0	------	0	0	0	0	0	0	0	0	5
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	12	4
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	3	------	0	44	10	7	0	6	1	28	203
Fall River	0	------	0	0	0	0	0	1	0	0	30
Springfield	0	------	0	1	0	1	0	1	0	1	31
Worcester	0	------	0	11	3	1	0	1	0	15	31
Rhode Island:											
Pawtucket	0	------	0	2	0	0	0	0	0	0	13
Providence	0	------	0	25	4	3	0	0	1	13	49
Connecticut:											
Bridgeport	0	1	0	2	2	0	0	0	0	0	21
Hartford	0	------	0	1	0	2	0	0	0	8	39
New Haven	0	------	0	14	3	0	0	0	0	5	41
New York:											
Buffalo	0	------	0	9	10	5	0	4	1	14	121
New York	9	3	1	63	32	19	0	59	4	163	1,170
Rochester	0	------	0	12	1	1	0	2	1	2	58
Syracuse	0	------	0	46	1	4	0	0	0	11	46
New Jersey:											
Camden	0	------	0	0	0	3	0	1	0	8	24
Newark	0	1	0	1	3	1	0	8	0	62	78
Trenton	0	------	0	0	0	0	0	6	0	0	33
Pennsylvania:											
Philadelphia	3	------	0	21	10	13	0	22	8	130	357
Pittsburgh	0	1	0	4	8	8	0	6	0	56	124
Reading	0	------	0	1	0	2	0	1	1	1	21
Scranton	0	------	-------	0	------	1	0	------	0	7	-------
Ohio:											
Cincinnati	0	------	0	0	4	6	0	4	0	13	100
Cleveland	0	1	0	2	4	7	0	12	0	86	157
Columbus	0	------	0	1	4	0	0	1	1	17	71
Toledo	0	------	0	4	0	0	0	5	0	60	60
Indiana:											
Anderson	0	------	0	0	2	0	1	0	0	3	11
Fort Wayne	0	------	0	0	0	1	0	1	0	0	27
Indianapolis	2	------	0	0	5	6	0	5	1	145	86
Muncie	0	------	0	0	0	1	0	0	0	0	11
South Bend	0	------	0	1	1	0	0	1	0	10	13
Terre Haute	0	------	0	0	3	0	0	1	0	0	28
Illinois:											
Alton	0	------	0	0	0	1	0	0	0	0	6
Chicago	11	1	1	8	9	38	0	36	1	129	554
Elgin	0	------	0	2	0	0	0	0	0	17	3
Moline	0	------	0	0	1	0	0	0	0	10	13
Springfield	0	------	0	0	1	0	0	1	1	5	15
Michigan:											
Detroit	4	------	0	18	3	20	0	10	1	85	215
Flint	0	------	0	3	1	2	1	0	0	2	19
Grand Rapids	0	------	0	4	1	1	0	1	0	3	21
Wisconsin:											
Kenosha	0	------	0	0	0	2	0	0	0	2	2
Madison	0	------	0	2	1	0	0	0	0	26	7
Milwaukee	0	1	1	6	1	8	0	0	0	24	80
Racine	0	------	0	1	0	0	0	0	0	4	15
Superior	0	------	0	2	0	0	0	0	0	0	11

[1] Figures for Wheeling and Tampa estimated; reports not received.

City reports for week ended July 22, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	2	2	3	0	0	0	0	17
Minneapolis	0	------	0	1	4	2	0	1	0	3	81
St. Paul	0	------	0	5	2	0	0	2	0	17	65
Iowa:											
Cedar Rapids	0	------	------	2	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	0	0	------	0	0	------
Des Moines	0	------	0	0	0	4	5	0	0	6	28
Sioux City	0	------	------	0	------	0	0	------	0	1	------
Waterloo	0	------	------	1	------	0	0	------	0	2	------
Missouri:											
Kansas City	1	------	0	0	2	2	1	5	0	1	100
St. Joseph	0	------	0	0	7	1	0	0	0	1	34
St. Louis	0	------	0	0	7	4	0	4	7	28	188
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	4	6
Grand Forks	0	------	------	0	------	1	0	------	0	0	------
Minot	0	------	------	1	------	0	0	------	0	0	------
South Dakota:											
Sioux Falls	0	------	0	0	0	6	0	0	0	0	10
Nebraska:											
Lincoln	0	------	0	0	------	1	0	------	0	28	------
Omaha	0	------	0	0	2	0	0	0	0	8	54
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	3
Topeka	0	------	0	1	1	2	0	0	0	2	27
Wichita	0	------	0	6	3	0	0	0	1	0	38
Delaware:											
Wilmington	0	------	0	2	1	2	0	1	1	0	25
Maryland:											
Baltimore	1	1	1	2	7	3	0	10	0	42	182
Cumberland	0	------	0	0	0	0	0	0	0	0	8
Frederick	0	------	0	0	1	0	0	0	0	0	1
Dist. of Col.:											
Washington	1	1	1	14	10	0	0	9	3	37	145
Virginia:											
Lynchburg	1	------	0	3	0	0	0	0	1	31	9
Norfolk	0	------	0	0	1	2	0	1	0	0	36
Richmond	0	------	0	5	1	0	0	1	3	1	42
Roanoke	0	------	0	4	0	0	0	0	0	0	14
West Virginia:											
Charleston	0	------	0	0	0	0	0	1	3	0	5
Huntington	0	------	------	0	------	0	0	------	1	0	------
Wheeling	------	------	------	------	------	------	------	1	------	------	15
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	1	2	0	0	0	5	20
Wilmington	0	------	0	0	0	0	0	0	0	1	16
Winston-Salem	1	------	0	0	0	0	0	3	0	0	16
South Carolina:											
Charleston	0	2	0	0	1	0	0	2	3	0	13
Florence	0	------	0	0	2	0	0	0	0	0	11
Greenville	0	------	0	0	1	0	0	0	0	0	27
Georgia:											
Atlanta	0	5	1	1	6	3	0	9	3	1	84
Brunswick	0	------	0	0	0	0	0	0	0	0	3
Savannah	0	1	0	0	2	0	0	1	0	22	25
Florida:											
Miami	0	4	0	0	1	1	0	0	0	1	24
Tampa	------	------	------	------	------	------	------	------	------	------	------
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	1	0	5
Covington	0	------	0	0	1	2	0	0	0	0	20
Lexington	0	------	0	2	1	0	0	1	1	0	21
Louisville	0	------	0	2	4	3	0	4	1	23	85
Tennessee:											
Knoxville	0	------	0	0	0	1	0	1	0	0	21
Memphis	0	------	0	0	4	0	0	5	4	25	77
Nashville	0	------	0	0	0	1	0	4	1	18	72
Alabama:											
Birmingham	0	------	0	2	2	0	0	1	2	9	72
Mobile	0	3	0	5	0	1	0	1	0	0	17
Montgomery	0	------	------	0	------	0	0	------	2	8	------

City reports for week ended July 22, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0			0		0	0		3	0	
Little Rock	1		0	0	2	0	0	1	1	0	4
Louisiana:											
Lake Charles	0		0	0	1	0	0	1	0	0	3
New Orleans	2		0	1	14	5	0	9	0	0	140
Shreveport	0		0	0	7	1	0	4	0	1	57
Oklahoma:											
Oklahoma City	0		0	1	1	1	0	1	0	0	37
Tulsa	0			0		1	0		3	0	
Texas:											
Dallas	2		0	4	1	1	0	3	6	4	49
Fort Worth	0		0	1	3	1	0	1	1	0	47
Galveston	0		0	0	0	0	0	0	0	0	11
Houston	1		0	3	5	0	0	10	1	6	84
San Antonio	0		0	0	1	0	0	6	4	1	67
Montana:											
Billings	0		0	0	0	1	0	0	0	2	8
Great Falls	0		0	13	0	0	0	0	0	0	7
Helena	0		0	1	0	1	0	0	0	0	2
Missoula	0		0	0	0	0	0	0	0	0	4
Idaho:											
Boise	0		0	0	1	0	0	0	0	0	6
Colorado:											
Colorado Springs	0		0	0	0	1	1	0	0	0	9
Denver	7		0	7	4	11	0	0	0	16	79
Pueblo	0		0	1	0	0	0	0	0	13	7
New Mexico:											
Albuquerque	0		0	0	0	0	0	3	0	1	15
Utah:											
Salt Lake City	0		0	4	3	4	0	0	0	19	45
Washington:											
Seattle	0		1	96	1	1	0	3	0	5	65
Spokane	0		0	10	1	2	0	2	0	0	42
Tacoma	0		0	7	3	0	0	0	0	0	32
Oregon:											
Portland	4		0	2	1	0	1	2	0	2	61
Salem	0			0		0	0		1	0	
California:											
Los Angeles	5	3	0	67	7	17	0	0	1	21	295
Sacramento	0		0	3	0	1	0	3	1	2	37
San Francisco	1		0	3	2	3	0	4	0	7	142

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Rhode Island:			
Providence	1	0	0
New York:			
Buffalo	0	0	2
New York	1	1	3
New Jersey:			
Newark	1	1	0
Pennsylvania:			
Philadelphia	1	2	3
Pittsburgh	0	0	2
Scranton	2	0	0
Illinois:			
Chicago	0	0	6
Michigan:			
Detroit	0	0	19
Minnesota:			
St. Paul	0	0	1
Missouri:			
Kansas City	0	0	1
St. Joseph	0	0	1
Nebraska:			
Omaha	0	0	1
Virginia:			
Norfolk	0		1
West Virginia:			
Huntington	1	0	0
South Carolina:			
Charleston	0	0	5
Georgia:			
Atlanta	0	0	1
Florida:			
Miami	0	0	1
Tennessee:			
Nashville	1	1	1
Louisiana:			
Shreveport	0	1	0
Texas:			
Houston	1	0	0
Colorado:			
Denver	0	0	1
California:			
Los Angeles	0	0	6

Encephalitis, epidemic or lethargic.—Cases: New York, 1; New Orleans, 1; Los Angeles, 1.

Pellagra.—Cases: Boston, 1; Winston-Salem, 1; Charleston, S. C., 1; Atlanta, 1; Savannah, 2; Louisville, 1; Birmingham, 3; Dallas, 1; San Francisco, 1.

Typhus fever.—Cases: Charleston, S. C., 1; Savannah, 2; Lake Charles, 1; Galveston, 2; Houston, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended July 8, 1939.—During the week ended July 8, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	2			1		4
Chickenpox		1		65	269	23	39	58	23	478
Diphtheria			3	54	7	10		1		75
Influenza					2	1			15	18
Measles			3	389	609	67		7	2	1,077
Mumps				13	25	8		1	4	51
Pneumonia		1			16		1		10	28
Poliomyelitis					9					9
Scarlet fever	1	5	13	57	87	16	8	12	1	200
Trachoma							2			2
Tuberculosis	2	14	27	119	62	5	25	3		257
Typhoid and paratyphoid fever		1	1	14	6		1			23
Whooping cough		1	2	53	121	16	16	63	17	289

EGYPT

Vital statistics—Third and fourth quarters 1938.—The following table shows the numbers of births and deaths for the third and fourth quarters of 1938 in all places in Egypt having a health bureau.

	Third quarter	Fourth quarter		Third quarter	Fourth quarter
Number of live births	48,983	61,447	Deaths from:—Continued		
Live births per 1,000 population	41.2	51.7	Diphtheria	121	232
Number of stillbirths	1,014	1,169	Dysentery	124	94
Number of deaths	46,383	31,684	Heart disease	1,330	1,345
Deaths per 1,000 population	39.1	26.7	Homicide	296	232
Deaths under 2 years of age	17,255	7,836	Influenza	32	21
Deaths under 2 years of age per 1,000 live births	352	128	Malaria	20	17
Deaths from:			Measles	394	80
Cancer	241	350	Nephritis	878	1,052
Cerebral hemorrhage, embolism and cerebral thrombosis	617	732	Pneumonia	3,583	3,294
Diabetes	229	202	Scarlet fever	2	
Diarrhea and enteritis (under 2 years of age)	10,914	3,195	Suicide	26	22
			Syphilis	131	90
			Tuberculosis (all forms)	677	612
			Typhoid fever	408	183
			Typhus fever	15	3
			Whooping cough	8	

SWEDEN

Communicable diseases—May 1939.—During the month of May 1939, cases of certain communicable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	3	Poliomyelitis	4
Diphtheria	14	Scarlet fever	5,535
Dysentery	1	Syphilis	31
Gonorrhea	876	Typhoid fever	13
Paratyphoid fever	36	Undulant fever	12

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for July 28, 1939, pages 1409-1421. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Shanghai.—During the week ended July 22, 1939, 2 cases of cholera were reported at Shanghai, China.

India—Karachi.—During the week ended July 22, 1 case of cholera was reported at Karachi, India.

French Indochina—Tonkin Province.—During the week ended July 22, 1 case of cholera was reported in Tonkin Province, French Indochina.

Smallpox

Eritrea—Massaua.—During the week ended June 17, 1 case of smallpox was reported at Massaua, Eritrea.

Senegal—Diourbel.—During the 10-day period ended June 20, 4 cases of smallpox were reported at Diourbel, Senegal.

Sudan (French).—During the 10-day period ended June 20, there were reported 8 cases of smallpox at Niafunke, and 19 cases at Macina, French Sudan.

Ivory Coast—Aboagourou.—During the 10-day period ended June 20, 10 cases of smallpox were reported at Aboagourou, Ivory Coast.

Portugal—Lisbon.—During the week ended July 15, 10 cases of smallpox were reported at Lisbon, Portugal.

Typhus Fever

Eritrea—Hamasien.—During the week ended June 17, 5 cases of typhus fever were reported at Hamasien, Eritrea.

Rumania—Bucharest.—During the period May 1 to 31, 1939, 40 cases of typhus fever were reported at Bucharest, Rumania.

Palestine—Jerusalem.—During the week ended June 17, 8 cases of typhus fever were reported at Jerusalem, Palestine.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

The poliomyelitis situation has changed but little within the past week. For the week ended August 12, 261 new cases were reported, as compared with 210 for the preceding week. While this indicates an increase of 24 percent over the preceding week, this is not disproportionate to the normal increase expected according to the 5-year median figures.

The 4 States reporting an abnormal number of cases for the week were as follows: Michigan, 78 cases; California, 51; Minnesota, 23; and South Carolina, 14. These States reported 166 cases, or 63 percent of the Nation's total for the current week. Detroit reported 65 cases for the week ended August 12, as compared with 37 for the week ended August 5 and with 31 cases for the week ended July 29. An analysis of cases reported in Detroit shows that, according to actual time of onset, there were only 25 cases for the current week as compared with 45 and 35 cases for the 2 preceding weeks. The additional cases included in the report for the current week represent delayed reports of cases that developed some time before actual report.

TREATMENT OF INDUCED MALARIA IN NEGRO PARETICS WITH MAPHARSEN AND TRYPARSAMIDE[1]

By Martin D. Young, *Junior Zoologist, United States Public Health Service*, and Sol B. McLendon, *South Carolina State Hospital*

Arsenicals have been tried from time to time in the treatment of malaria. According to various reports, such preparations as arsphenamine (salvarsan) and neoarsphenamine (neosalvarsan) relieve the symptoms of tertian malaria temporarily, but relapses are common. Against quartan (*Plasmodium malariae*) and estivoautumnal (*P. falciparum*) malaria these arsenicals have been less successful and very little benefit has usually attended their use.

[1] Contribution from the Williams Malaria Research Laboratory for Field Investigations of Malaria, of the National Institute of Health, U. S. Public Health Service, and the South Carolina State Hospital, Columbia, S. C.

Mapharsen, a trivalent arsenic compound formed by the oxidation of any of the arsphenamines, has recently come into use in the treatment of syphilis. Goldman (*1*), working with both natural and induced tertian malaria (*P. vivax*), used mapharsen to terminate the chills and fever with "strikingly good effect." Nine of his patients received 11, one received 4, and 14 patients received 1 intravenous injection of 0.04 to 0.06 gm. of mapharsen. There were only 2 relapses and both of these occurred after the patients had received only 1 injection of mapharsen. These relapses were subsequently cured by additional injections of mapharsen. Goldman stated that this drug was immeasurably more effective than quinine for the treatment of malaria.

During the past year, at the South Carolina State Hospital, a series of 10 Negro paretics who had been infected for therapeutic purposes with quartan malaria were given mapharsen. Each patient received 0.04 gm. of mapharsen intravenously weekly for a period of 10 weeks. At the same time 0.02 gm. of thiobismol was given. Subsequently, 2 of the 10 patients received a course of tryparsamide.

Twenty-two weeks after the completion of the mapharsen treatment, blood smears from all 10 patients still showed parasites (*P. malariae*), although the patients showed no symptoms of the disease. To test the viability of the parasites, subinoculations were made from 2 of the mapharsen-treated paretics to 2 uninfected persons. Typical symptomatic and parasitic infections with quartan malaria developed in both, which showed that the mapharsen had not affected the viability of the malaria parasites.

Examinations were made of 3 quartan malaria patients who had received tryparsamide in antisyphilitic treatment. One year after the completion of the tryparsamide treatment 2 patients still harbored *P. malariae* in the blood stream. Another patient still had parasites 9 months after treatment.

Another group of 8 patients was started on tryparsamide. Four patients completed the 10-week treatment, and the malaria parasites were continually present. Treatment of the other 4 was interrupted after the fifth week, and all had shown malaria parasites continually. Subinoculation from one of this group, in the fifth week of tryparsamide treatment, resulted in a typical symptomatic and parasitic course of malaria, showing that the parasites were still viable.

DISCUSSION

A drug specific for both syphilis and therapeutic malaria would have obvious advantages in the treatment of neurosyphilis. Mapharsen has been suggested in this capacity by Goldman (*1*) where tertian

malaria (*P. vivax*) is used. However, quartan malaria is being used rather widely in the treatment of paresis because of the several favorable characteristics of this type, such as relative absence of immunity in patients, reliability, and favorable length of the rest periods between paroxysms. Therefore, mapharsen was tried on this type.

In our experience mapharsen did not eradicate the parasites in a single malarial infection, although it relieved the symptoms. Such a condition seems to be undesirable, since malaria carriers who show no symptoms might be paroled from the hospital. The authors know of one instance in which this has happened. In this way foci of infections might be established for a type of malaria which is now rare in the United States. Because of this possibility, mapharsen should not be relied upon to terminate quartan malaria.

Likewise, tryparsamide, either alone or in combination with mapharsen, proved to be ineffectual in eradicating *P. malariae* in 13 cases at this hospital. Therefore, this drug, like mapharsen, should not be used to terminate quartan malaria.

SUMMARY AND CONCLUSIONS

Mapharsen, recently reported to be effective against tertian malaria (*P. vivax*), was tried against quartan malaria (*P. malariae*). Ten Negro paretics in whom malaria was used in antisyphilitic treatment were given mapharsen. Two of the patients also received a course of tryparsamide. These patients still showed parasites in blood smears 22 weeks after completion of the mapharsen treatment. Subinoculations from 2 of the mapharsen-treated paretics resulted in typical malaria infections, thus proving that the parasites were viable.

In 11 Negro paretics, tryparsamide was used against *P. malariae.* The parasites never disappeared from the blood. A subinoculation from the tryparsamide-treated group produced an infection, proving that the parasites were viable.

As these drugs relieved the symptoms without eradicating the infection, it is pointed out that their use might inadvertently result in quartan malaria carriers being released and thus establish foci of infections of a type of malaria now rare in the United States.

REFERENCE

(1) Goldman, D.: The use of mapharsen in the treatment of malaria. Am. J. Med. Sci., **196**: 502-509 (1938).

PULMONARY TUMORS IN MICE[1]

By H. B. Andervont, *Senior Biologist, United States Public Health Service*

VI. TIME OF APPEARANCE OF TUMORS INDUCED IN STRAIN A MICE FOLLOWING INJECTION OF 1:2:5:6-DIBENZANTHRACENE OR 20-METHYLCHOLANTHRENE

Investigations reported previously from this laboratory (*1*) have shown that the lungs of strain A mice are more susceptible to the carcinogenic activity of dibenzanthracene [2] than are their subcutaneous tissues. It has been found consistently that, following subcutaneous injection of 0.8 mg. of dibenzanthracene as a lard solution, practically every mouse exhibited lung tumors 3 months later, while the average time of appearance of tumors at the injection site was 6 to 7 months (*6*).

The fact that strain A mice develop pulmonary growths within 3 months after subcutaneous injection of 0.8 mg. of dibenzanthracene dissolved in lard indicates a high degree of uniformity in the latent period of these tumors and presents an excellent opportunity for histological studies of the development of induced tumors. It is apparent that a better understanding of premalignant changes can be derived from a study in which it is known that every animal will develop tumors at approximately the same time. Furthermore, the occurrence of tumors in the lungs following subcutaneous injection obviates traumatic and other changes taking place at the injection site which have no direct bearing upon the induction of tumors.

This paper is a brief description of the results of 9 experiments performed in 1937 to determine the time of appearance of macroscopic lung nodules in strain A mice following the injection of dibenzanthracene or methylcholanthrene. The same procedure was carried out in all the experiments. Beginning 2 weeks after injection 2 or 3 animals were sacrificed each week and examined for the presence of lung nodules; the lungs were fixed and examined microscopically to confirm the macroscopic observations. No efforts were made to study the development of the induced tumors since such studies involve serial sections of the lung tissue, a procedure which could not be attempted at the time. The only outstanding feature of the development of the induced tumors obtained from the study of a considerable number of stained preparations was the absence of any evidence of irritation, as revealed by the lack of inflammatory reaction, in lungs prior to and throughout the early stages of tumor development.

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[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

[2] Throughout this paper the term dibenzanthracene signifies 1:2:5:6-dibenzanthracene and the term methylcholanthrene means 20-methylcholanthrene.

The findings of all 9 experiments have been condensed and are presented in table 1. In the table the results of the weekly examinations are represented as fractions in which the numerators denote the number of mice with macroscopic lung tumors and the denominators the number of mice examined.

TABLE 1.—*Summary of nine experiments to determine the time of appearance of macroscopic lung tumors in strain A mice following injections of dibenzanthracene or methylcholanthrene*

Hydrocarbon used	Route of injection	Amount injected, in mg.	Time, in weeks, for appearance of lung tumors[1]								
			2	3	4	5	6	7	8	9	10
Dibenzanthracene	Subcutaneous	0.8	0/13	0/12	6/20	1/16	8/22	12/20	21/23	9/9	29/29
Do	Intravenous	0.2	0/4	0/4	0/4	1/4	4/4	5/6	4/4	6/6	----
Do	....do	0.5 or 1.0	0/5	0/5	3/6	4/5	19/19	2/2	2/2	2/2	2/2
Methylcholanthrene	Subcutaneous	0.8	----	0/4	2/6	1/7	3/6	4/6	5/7	----	----
Do	Intravenous	0.375 to 1.0	0/7	0/7	2/10	5/7	25/25	5/5	----	----	----

[1] Numerators denote number of mice showing lung nodules. Denominators denote number of mice killed.

Following the subcutaneous injection of 0.8 mg. of dibenzanthracene, tumors began to appear 4 weeks after injection and by the eighth week after injection virtually all the animals had lung nodules. In these experiments the carcinogen was injected in a lard solution in doses of 0.2 cc. and 0.4 cc. of the solvent; in a horse-serum dispersion in doses of 0.8 cc. and 2 cc. of horse serum; in 2 cc. of a lard emulsion in water; in 2 cc. of an olive-oil emulsion in water; in 0.4 cc. of a mouse-fat emulsion in water; and in 0.4 cc. of a lard emulsion in serum. Lung tumors appeared at approximately the same time following the use of the different preparations.

Investigations in which the hydrocarbon was injected in different emulsions were performed in collaboration with Dr. Egon Lorenz, who made the preparations. These experiments represent efforts to ascertain whether the preparations exerted any influence upon the time of appearance of induced internal tumors. It is to be noted that lung tumors were induced by the carcinogen injected as a mouse-fat emulsion because Peacock and Beck (*15*) found that 1.0 mg. of 3:4-benzpyrene dissolved in 0.2 cc. of mouse fat induced few tumors in mice at the site of subcutaneous injection. These authors believed that the carcinogen, when dissolved in mouse fat, was absorbed and eliminated before it was able to produce tumors, but experiments performed in this laboratory (*8*) revealed that mouse-fat solutions of dibenzanthracene or methylcholanthrene induced subcutaneous tumors as readily as did lard solutions.

As seen in table 1, 0.2 mg., 0.5 mg., or 1.0 mg. of dibenzanthracene, when injected intravenously, produced lung tumors in practically all the mice within 6 weeks, indicating that intravenous injection of 0.2 mg. or 0.5 mg. of the carcinogen induced lung tumors earlier than did 0.8 mg. when injected subcutaneously.

Table 1 also reveals that 0.8 mg. of methylcholanthrene, injected subcutaneously, and 0.375 mg. to 1.0 mg. of methylcholanthrene, injected intravenously, induced pulmonary tumors at approximately the same time as did similar amounts of dibenzanthracene. Shimkin (*17*) has found multiple lung tumors in strain A mice 4 months after intravenous injection of 0.1 mg. of methylcholanthrene in a horse-serum dispersion.

DISCUSSION

The outcome of this series of investigations permits several conclusions: Strain A mice possess a high degree of susceptibility to the induction of pulmonary tumors by these hydrocarbons; intravenous injection is more efficacious than subcutaneous injection for the induction of pulmonary tumors; and smaller quantities of the hydrocarbons than those used in these studies may be capable of producing pulmonary growths in strain A mice. As mentioned previously, 0.8 mg. of dibenzanthracene in a variety of preparations evoked tumors within 4 to 8 weeks, which suggests the use of smaller amounts of the carcinogen for more precise determinations of the influence of the solvent. Furthermore, the fact that a single intravenous injection of 0.2 mg. of dibenzanthracene or 0.1 mg. of methylcholanthrene is capable of inducing tumors in practically all mice of strain A within a relatively short period of time suggests that smaller amounts may evoke tumors.

The appearance of lung tumors following injection of small amounts of carcinogenic hydrocarbons has some bearing upon the explanation of the occurrence of induced tumors in mice. Two possibilities have received considerable attention (*11*): (1) The carcinogen produces a systemic change resulting in a lowered resistance to tumor development; (2) the carcinogen is absorbed and acts directly on the lung tissues.

The possibility of a systemic change resulting in the appearance of lung tumors in mice may be of more than academic interest, for if the tumors arise because of an altered constitution which is elicited by an agent injected at a site distant from the lungs, it is not impossible that similar conditions may cause tumors in other species.

There are several facts which may be interpreted as evidence that a general lowered resistance is responsible for the occurrence of induced lung tumors in mice. First, the induced and spontaneous tumors in mice of strain A have the same macroscopic and microscopic

structure and both have a tendency to arise just beneath the pleura. Moreover, identical lung tumors occur in strain A mice following injection of dibenzanthracene by the subcutaneous, intravenous, intrapleural, intraperitoneal, or intratracheal routes (*17*), and also following ingestion (*14*). Second, it has been shown (*6*) that different inbred strains of mice exhibit variations in susceptibility to the development of spontaneous lung growths and those strains which have the highest incidence of spontaneous growths are most susceptible to the development of induced tumors. Hence, it may be argued that the carcinogen releases the tendency toward tumor development in strains which already have a genetic make-up conducive to pulmonary tumors.

While it is known that the susceptibility of the lungs of strain A mice to the development of both spontaneous (*10*) and induced (*2*, *5*) tumors is inherited according to genetic principles, nevertheless up to the present time an inbred strain or their hybrids which are completely resistant to the induction of lung tumors by dibenzanthracene has not been found. They have been evoked (*9*) in mice of the C57 black strain, a strain very resistant to the development of spontaneous pulmonary tumors. While it may appear logical to assume that an inherited susceptibility is responsible for the occurrence of induced tumors in strains which are highly susceptible to spontaneous growths, it is not clear how an inherited susceptibility could be responsible for the tumors in strains which are very resistant to spontaneous lung tumors were it the only factor involved in their occurrence. If an altered constitution is the reason for the appearance of the tumors in one strain it should follow that it is also responsible for the same type of tumor in other strains. Hence, it is believed that the genetic constitution of the experimental animals should not be regarded as the only factor involved in the appearance of induced lung tumors. The difference in susceptibility to induced pulmonary tumors, as exhibited by the various strains of mice, is a matter of degree and it is suggested that hereditary factors exert their influence by controlling the degree of susceptibility.

It is difficult to design an experiment capable of elucidating the problem as to whether the carcinogenic action of the hydrocarbons is local in the lungs or whether it brings about a release of inherited tendencies. The results presented here reveal that very small amounts are capable of causing tumors in the lungs of strain A mice, which implies that if the cancer-inducing agent is injected subcutaneously, only a small quantity need be absorbed to act upon the lung tissue and produce tumors. But it can also be interpreted as showing that only small amounts are necessary to alter the constitution of the test animal. The induction of pulmonary tumors in strain A mice by placing a known quantity of dibenzanthracene at a site distant from the lungs and recovery of *all* of the carcinogen at a later date would be

evidence that direct contact of lung tissue with the agent is not essential.

There is experimental evidence suggesting that direct contact of dibenzanthracene with lung cells exerts an influence upon the occurrence of pulmonary tumors in mice. It has been shown that tumors are induced when the hydrocarbon is introduced directly into the lungs. In one experiment (*3*) silk threads were coated with the agent and placed in the lungs of mice; tumors arose around the coated threads. In another series of investigations (*4*), dibenzanthracene was adsorbed onto charcoal and injected intravenously into strain A mice; it localized in the lungs and produced tumors. When charcoal-adsorbed dibenzanthrancene was injected subcutaneously into strain A mice, lung tumors were not induced and it was shown that the charcoal held the carcinogen at the site of injection. Equal quantities of dibenzanthracene (*8*) were injected subcutaneously in lard solutions or in serum dispersions; the latter materials induced fewer tumors at the site of injection but more lung tumors. This indicated that more lung tumors were evoked when the carcinogen was injected in a medium which left the site of injection, thereby offering it better opportunity to come in contact with lung tissues. Finally, it has been shown previously (*7*) and is confirmed in this paper that, so far as the induction of lung tumors is concerned, dibenzanthracene is more efficacious when injected intravenously than subcutaneously. The intravenous route gives the agent ample opportunity for direct action upon the lungs.

Lettinga's publication (*13*) may be regarded as further evidence that lung tumors are evoked by the direct action of the hydrocarbon. When mice were injected subcutaneously with from 0.0125 to 1.0 mg. of dibenzanthracene, they developed subcutaneous tumors and few lung tumors; when they received from 2.5 to 5.0 mg. of the hydrocarbon subcutaneously, they developed subcutaneous tumors and many pulmonary tumors. The findings may be interpreted by assuming that below a certain amount (2.5 mg.) the carcinogen was retained at the injection site or stored within the body, while above this amount the excess overflowed and produced pulmonary growths by acting upon the lung tissue. It could also be assumed, however, that a definite quantity of the agent was essential for lowering the resistance of the mice to such a degree that the inherited tendency could manifest itself. A third possibility is that the experiment determined the relative susceptibility of subcutaneous and lung tissues of the test mice to the carcinogenic activity of dibenzanthracene. Lettinga's animals must have been more resistant to the induction of pulmonary tumors than are mice of strain A, for 2.5 mg. of the subcutaneously injected hydrocarbon were necessary for definite lung-

tumor production in Lettinga's animals, while 0.8 mg. of the hydrocarbon injected subcutaneously induces pulmonary growths in practically every strain A mouse within 10 weeks. A part of the injected hydrocarbon could have been absorbed from the injection site in all of Lettinga's animals but only when 2.5 mg. were injected was a sufficient quantity absorbed to induce pulmonary tumors. This is regarded as additional evidence that dibenzanthracene induces pulmonary tumors in mice by direct contact with lung cells and it also implies that small amounts of dibenzanthracene when injected subcutaneously into strain A mice should induce subcutaneous tumors only. The use of mice more susceptible to the induction of lung tumors than those employed by Lettinga may be desirable for confirmation of the work, as smaller amounts of lard-dibenzanthracene solutions could be injected subcutaneously and would produce lung tumors; in this laboratory the large amounts of lard-dibenzanthracene solutions (5 mg. in 2.5 cc. of lard) used by Lettinga for subcutaneous injection produce severe ulceration at the injection site in all strains of mice.

From the foregoing discussion it is evident that the direct action of dibenzanthracene upon pulmonary tissues plays some role in the development of induced lung tumors in mice. It is agreed that hereditary factors also play an important part in their appearance; indeed, the importance of a special organ susceptibility cannot be overemphasized. But it is essential to recall (*6*) that the genetic constitution of the experimental animal is of importance in all phases of experimental cancer; inbred strains of mice vary in their susceptibilities to the development of spontaneous tumors of different organs, in their abilities to overcome the growth energies of transplantable tumors, and in their responses to the induction of local tumors by carcinogenic agents. It is well known that environmental conditions exert a decided influence upon the occurrence of certain types of tumors in strains possessing a tendency to develop them spontaneously. For example, male mice belonging to a strain in which the females are highly susceptible to spontaneous breast cancer respond to injections of estrogens (*12*) by developing breast cancer, while males derived from strains in which the females exhibit a low incidence of this type of cancer are, as a rule, much more resistant to the action of estrogens.

In the production of tumors at the injection site by carcinogenic agents as well as in the induction of tumors in organs removed from the site of administration (mammary tumors induced by estrogens and liver tumors induced by 2-amino-5-azotoluene) the genetic constitution of the experimental animals is generally accepted as of prime importance, but none of these tumors is assumed to result from a

release of inherited tendency alone. To assume, therefore, that the induction of pulmonary tumors in mice is caused only by a general lowering of resistance implies that this type of tumor is unique. It is believed that experimental evidence available up to the present time does not justify this view and it is suggested that, until experimental evidence to the contrary is presented, the induction of lung tumors in mice should be regarded as the result of the action of a carcinogenic agent upon a highly susceptible tissue.

In the foregoing discussion two factors (heredity and organ susceptibility) have been considered to be involved in the induction of pulmonary tumors, but other possibilities should receive attention. It can be postulated that an unknown agent normally present within the body of mice is responsible for the occurrence of spontaneous lung tumors and that the cancer-inducing hydrocarbons, or derivatives, hasten the appearance of tumors by supplementing its activity. This might imply that the agent and the hydrocarbons have a chemical relationship. There is also the possibility that the hydrocarbons enable the body to produce more of the agent in a manner similar to the action of the bacteriophage, which increases in quantity or in degree of activity when brought in contact with bacteria. Again, the carcinogens may cause the elimination or neutralization of a substance in the body which normally holds the unknown agent in abeyance; the agent would then be free to act upon highly susceptible lung tissues. In this connection White and White (*18*) have published results of methylcholanthrene feeding to rats and conclude that "methylcholanthrene may produce a deficiency in the sulfur-containing amino acids, possibly by virtue of the involvement of these amino acids in the detoxication of the hydrocarbon."

Finally, the hydrocarbons, or their derivatives, may act directly upon the lung cells and render them more susceptible to the cancer-inducing power of the unknown agent. This speculation is based upon the work of Rous and Kidd (*16*) who found that when the Shope papilloma virus is injected intravenously into rabbits whose ears have been painted with tar, the virus localizes in the tarred area and malignant growths appear within a much shorter period of time than when the neoplasms are produced by tar-painting alone. Irritants or trauma have long been recognized as important factors in the localization of viruses within susceptible tissues; tumors usually arise at the point of puncture when a filtrate of the chicken tumor agent is injected intravenously. These observations suggest that the hydrocarbon may act upon the lung tissue in a manner similar to that of tar in the experiment of Rous and Kidd by preparing a fertile soil within the lungs of mice upon which an unknown agent could readily set up a series of changes which eventuate in malignancy.

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VII. FURTHER STUDIES ON THE SERIAL TRANSMISSION OF LUNG TUMORS OCCURRING IN INBRED MICE

In an earlier publication (1) serial passages of 7 pulmonary tumors arising in mice following parenteral introduction of 1:2:5:6-dibenzanthracene were described. All the tumors occurred in mice of strain A and all implantations were made into the subcutaneous tissues of other members of the same strain. In three instances the primary tumors were adenomatous in structure, but in the succeeding passages spindle cells became predominant. Interest was aroused in the problem because all three tumors undergoing the pronounced change in histologic appearance were induced tumors, while one tumor (lung tumor F) which failed to assume a spindle cell appearance was, in all probability, a spontaneous growth. The question arose as to whether the induced tumors only became sarcomatous upon serial transplantation. Consequently, a number of other spontaneous or induced pulmo-

nary tumors have been carried through serial passages by subcutaneous inoculation in order to determine (*a*) whether spontaneous pulmonary tumors arising in strain A mice exhibit the change when carried through animal passages, and (*b*) whether the phenomenon occurs when induced lung tumors arising in other strains of mice are transplanted into members of the same strain. In other words, is the change a unique characteristic of pulmonary tumors arising in strain A mice, or is it characteristic of transplanted pulmonary tumors in inbred mice in general?

EXPERIMENTAL

The usual trocar technique was employed for all implantations, which were made subcutaneously in the right axillary region. A tumor arising in a certain strain was always transplanted into individuals of the same strain. Mice of strains A, C, and C_3H were used since these strains were known (*2, 3*) to be susceptible to both spontaneous and induced pulmonary growths. Material for histologic study was obtained from every transplanted tumor. All histologic preparations were examined by Pathologist H. L. Stewart of this laboratory.

A detailed account of the procedure by which the tumors were induced and of the results of serial transmission was presented in a previous report (*1*). It is felt that a similar description of all 13 tumors used in this study would be unnecessary. The pertinent data are presented in table 1.

TABLE 1.—*Summary of 20 pulmonary tumors arising in inbred mice and carried through serial passages in normal mice*

Lung tumor designation	Strain of mice in which the tumor originated	Spontaneous or induced by dibenzanthracene	Histological appearance of original tumor in lung	Number of serial passages in subcutaneous tissues	Histological appearance of last passage tumor in subcutaneous tissue
A	A	Induced	Not available	22	Spindle cell.
B	A	do	do	15	Do.
C	A	do	Adenomatous tumor	12	Do.
D	A	do	do	10	Do.
F	A	?	do	49	Atypical.
G	A	Induced	do	17	Do.
H	A	do	do	10	Glandular.
I	A	Spontaneous	do	11	Atypical.
L	A	do	do	8	Spindle cell.
M	A	do	do	4	Glandular.
N	C	Induced	do	2	Do.
O	C	do	do	6	Spindle cell.
P	A	Spontaneous	do	7	Atypical.
R	C_3H	Induced	do	6	Do.
S	C	do	do	6	Glandular.
T	A	Spontaneous	do	6	Atypical.
U	C	Induced	do	2	Glandular.
W	C	do	do	6	Atypical.
X	C	do	do	6	Glandular.
Z	C_3H	do	do	6	Spindle cell.

The table includes records of all serial transplantations of spontaneous or induced tumors carried out in this laboratory up to the present

time with the exception of one tumor (lung tumor J) which was induced by placing the carcinogen in direct contact with lung tissues. The designation of each tumor is listed in the first column of the table and the strain of mice in which it arose is indicated in the second column. Twelve tumors were found in strain A mice, 6 in strain C mice, and 2 in strain C_3H animals.

The third column of the table indicates whether the tumors were induced or of spontaneous origin. Of the 12 strain A tumors 5 arose spontaneously and 6 were induced. Lung tumor F is considered questionable since it was found in a 20-month old strain A mouse which had received subcutaneously a cholesterol pellet containing 0.001 percent 1:2:5:6-dibenzanthracene. Since the majority of strain A mice develop spontaneous pulmonary tumors at an average age of 18 months (*4*) this was probably a spontaneous tumor, but the presence of the hydrocarbon in the animal cannot be ignored. All tumors arising in strain C or strain C_3H mice were induced by parenteral injection of dibenzanthracene.

The histologic diagnoses of the original pulmonary tumors are shown in the fourth column of the table. Stained preparations of the original tumors A and B were not available. The remainder were all designated as adenomatous tumors, consisting of cuboidal and columnar cells growing chiefly in papillary and adenomatous arrangement (figs. 1 and 2). The histologic structure of spontaneous pulmonary tumors in mice has been described by Tyzzer (7), and the appearance of the induced growths is similar to that of the spontaneous tumors.

Some of the induced pulmonary tumors arose in mice which had received a subcutaneous injection of the carcinogen and were found after a tumor had appeared at the injection site. In such instances the subcutaneous tumor was examined microscopically to rule out the possibility that the lung tumors were metastases. All the subcutaneous growths were spindle cell sarcomas with the exception of one occurring in a male strain C mouse from which lung tumor W was obtained; the subcutaneous tumor in this animal was diagnosed as an adenosquamous cell carcinoma, possibly of mammary gland origin. While the microscopic appearance of the original nodule from which lung tumor W was obtained was a typical adenomatous tumor, nevertheless the possibility of a metastatic nodule cannot be completely eliminated.

The number of serial passages for each tumor is shown in the fifth column of the table. It was intended to carry each tumor through at least 6 animal passages but 3 of the tumors (M, N, and U) were discontinued after 4, 2, and 2 passages, respectively, because the implants failed to show evidence of growth 3 months after subcutaneous inoculation. This does not mean that the tumors failed to propagate themselves in the subcutaneous tissues, for growth might have been

noted if the animals had been kept under observation for longer periods of time. All the tumors which were propagated successfully through more than 4 passages grew slowly in earlier passages and increased in growth rate in later passages. In this respect they resembled tumors A, B, C, D, and F, which have been described in detail in an earlier report (*1*).

In the last column of the table the histologic diagnosis of the final passage of each tumor is given. Tumors failing to exhibit any pronounced change in histologic structure were designated as glandular tumors; these continued to reproduce the typical glandular structure with cuboidal and columnar cells as found in the primary tumors (fig. 5). Lung tumors H, M, N, S, U, and X were included in this group.

Seven tumors (F, G, I, P, R, T, and W) are listed as atypical tumors. These tumors did not reproduce the glandular structure of the original tumors but revealed a definite change in structural arrangement (fig. 4). The tumor cells grew solidly in the form of large masses, nests, and thin strands; some tended to be round or oval, and a few were polyhedral in shape. The nests and strands were separated, in some instances, by spindle cells, but the majority of the tumor cells resembled epithelial cells.

The seven remaining tumors (A, B, C, D, L, O, and Z) consisted of spindle cells arranged in interlacing bundles running in different directions and contained no recognizable glandular elements. The blood vessels were slitlike and immature. These tumors resembled spindle cell sarcomas (fig. 3).

DISCUSSION

In the 20 pulmonary tumors of mice studied, 6 were adenomatous in structure in the primary growth or first passage, but upon serial passages in the subcutaneous tissues of other mice became predominantly spindle cell in appearance. Of the tumors exhibiting the pronounced structural change, 1 arose spontaneously in a mouse of strain A, 3 were induced with dibenzanthracene in strain A mice, 1 was induced

EXPLANATION OF PHOTOMICROGRAPHS

The photographs are presented to illustrate the morphology of the growths obtained when primary lung tumors underwent serial passages in the subcutaneous tissues of normal mice. Figures 1 and 2 illustrate a typical primary lung tumor and figure 3 shows the last passage of this tumor which has changed to a spindle cell growth. Figures 4 and 5 are characteristic of 2 other types of growth obtained upon serial passage of tumors identical in histologic structure to that shown in figures 1 and 2. In figure 4 the glandular arrangement has been lost although the individual cells maintain the same appearance as in the original tumor. In figure 5 the glandular structure has remained unchanged.

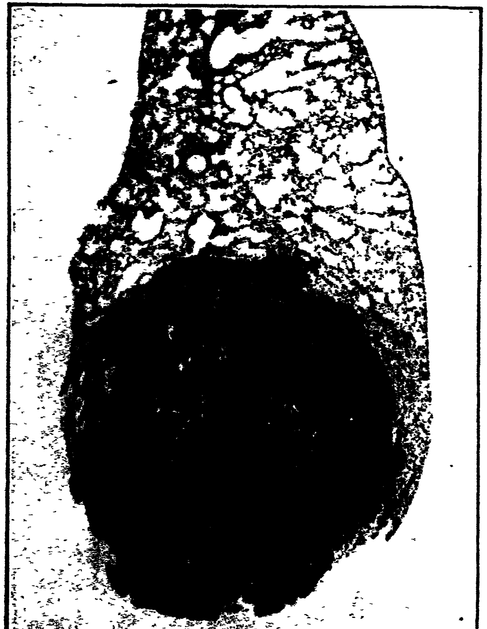

FIGURE 1.—Lung tumor L. Primary growth. (X 23)

FIGURE 2.—Lung tumor L. Primary growth. (X 125)

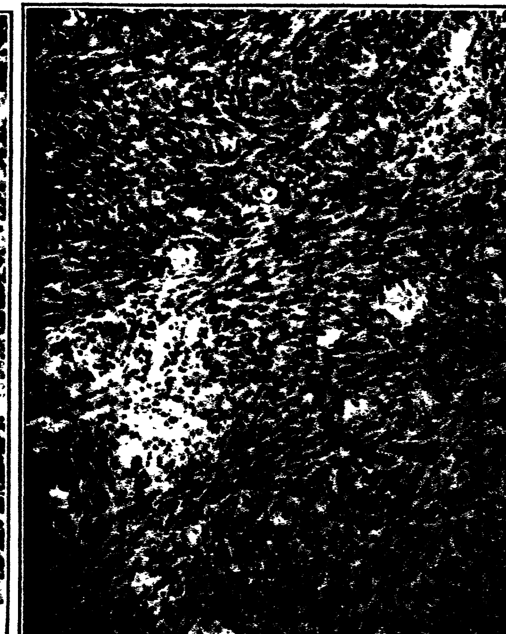

FIGURE 3.—Lung tumor L. Eighth passage. (X 125.)

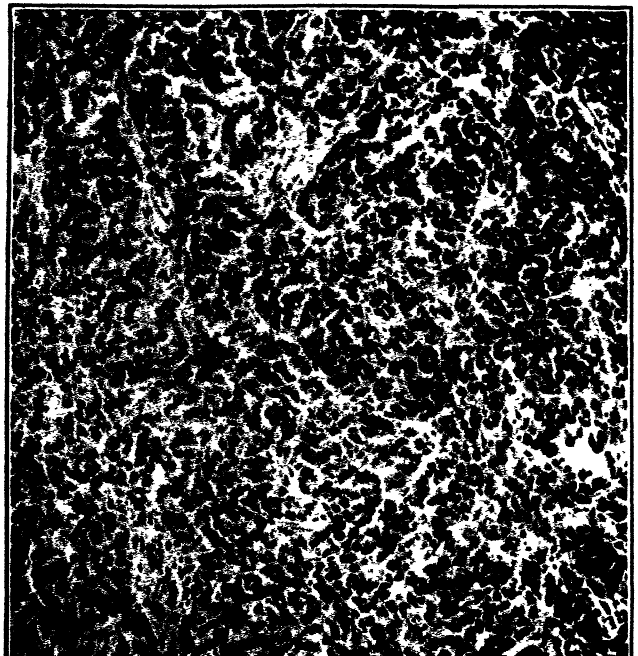

FIGURE 4.—Lung tumor F. Forty-ninth passage. (× 125)

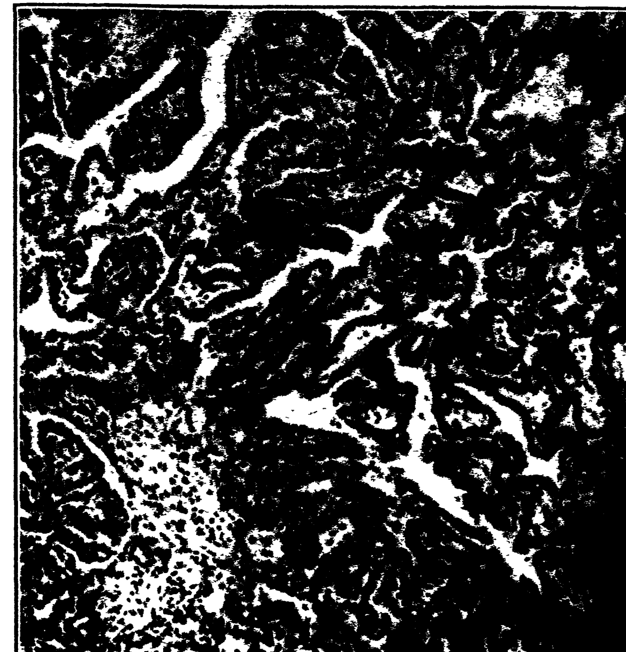

FIGURE 5.—Lung tumor H Tenth passage. (× 125.)

in a strain C mouse, and 1 was induced in a mouse of strain C_3H. It may be concluded, therefore, that the phenomenon is not restricted to induced tumors only or to tumors induced in mice of strain A. Whether this transition is limited to pulmonary tumors of mice or to pulmonary tumors arising in highly inbred strains of mice is unknown. Gorer (*6*) records one spontaneous tumor arising in a strain A mouse which "appeared to be a typical mammary carcinoma" macroscopically and became sarcomatous upon transplantation. It is possible that a thorough study of other types of tumors appearing in highly inbred mice may also reveal the phenomenon.

Several explanations may be postulated for the change in appearance of lung tumors during animal passages: (1) The lung tumors arise as mixed tumors and the sarcoma cells overgrow the carcinoma cells in the subcutaneous tissues of the host; (2) the stroma cells supplied by the animal bearing the transplanted tumor become sarcomatous; (3) the malignant epithelial cells change in appearance; (4) the primary tumors are not epithelial tumors. The investigations recorded here fail to offer any conclusive evidences favoring any of the above-mentioned possibilities. Campbell (*5*) reported 13 mice, 7 of which had primary pulmonary tumors containing spindle cells and 6 of which had primary lung tumors in which "there was evidence of change to this type of cell." Such observations suggest that some tumors may arise as mixed tumors or that the spindle cells are a transition from the carcinoma cells. Histologic examinations of the primary lung tumors used in this investigation have not revealed any definite evidence of spindle cells, but serial sections of the original tumors have not been made. Stained preparations of some transplants show definite stretching of carcinoma cells, but this also occurred in tumors which did not assume a spindle cell structure in subsequent passages.

The stroma of the majority of the transplants contained some spindle cells which appeared to have malignant characteristics, but similar cells were also seen in tumors which failed to change into spindle cell growths. Indeed, they were observed in tumors which continued to reproduce the structure of the original lung tumor. The possibility that the primary tumors consist of sarcoma cells cannot be evaluated until a better knowledge of the embryological origin of the alveolar cells of the lung is available. Certainly the histologic appearance of any of the original lung tumors used in this study does not permit a diagnosis of sarcoma.

SUMMARY

Twenty pulmonary tumors arising in inbred mice were used in this investigation. Five tumors arose spontaneously in strain A mice while 6 were induced in strain A mice, 6 were induced in strain C mice

and 2 were induced in mice of strain C_3H by parenteral injection of 1:2:5:6-dibenzanthracene. One tumor found in a strain A mouse could not be classified definitely as spontaneous or induced. The tumors have undergone from 2 to 49 serial passages in the subcutaneous tissues of normal mice of the strain in which they originated. Histologic examination revealed that 18 of the primary lung tumors were of an adenomatous structure. During animal passages 6 tumors retained the histologic structure of the original tumor, 7 lost the structure of the original tumor to a considerable extent, while 5 changed into spindle cell tumors.

Of the 5 tumors which became spindle cell in appearance, 1 arose spontaneously in a strain A mouse, 2 were induced in strain A mice, 1 was induced in a strain C mouse, and one was induced in a strain C_3H mouse. It is concluded that both spontaneous and induced tumors exhibit the phenomenon and that the change is not limited to pulmonary tumors occurring in any particular strain of mice.

The investigation does not offer any explanation for the pronounced change in histologic structure of some lung tumors during serial passages in the subcutaneous tissues of normal mice.

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VIII. THE INDUCTION OF PULMONARY TUMORS IN MICE OF STRAINS D, M, C57 BROWN, AND C57 BLACK BY 1:2:5:6-DIBENZANTHRACENE

The induction of pulmonary growths in mice of strain A by parenteral administration of a carcinogenic agent might be expected because of the frequent occurrence of spontaneous lung tumors (*8*) in this strain. Furthermore, a review of the literature reveals (*1*) that virtually all investigators who report the induction of pulmonary tumors in mice by tar-painting or by injection of carcinogenic hydrocarbons have also found spontaneous growths in the lungs of control mice belonging to the stocks in which induced tumors occurred. Previous work (*4*) shows that strains of mice exhibit pronounced

variations in susceptibility to induced lung tumors and that those strains which develop the most spontaneous pulmonary tumors are the most susceptible to induced growths. The question arises whether it is possible to induce lung tumors in inbred mice belonging to strains which are regarded as highly resistant to the appearance of spontaneous pulmonary tumors. The present report consists of brief descriptions of five experiments performed to test this possibility.

EXPERIMENTAL ANIMALS

Few observations are available concerning strains of mice with a low incidence of spontaneous lung tumors. Mice of strains C57 black, strain D, strain M (leaden), and strain C57 brown were used as the resistant lines. According to Bittner and Little (*7*), as well as Bittner (*8*), the C57 black mice have an incidence of less than 1.0 percent spontaneous pulmonary tumors, while Cloudman, Bittner, and Little, in a joint publication (*9*), report 0.0 percent incidence for this strain. Bittner (*5*) did not observe any spontaneous pulmonary tumors in strain D mice and, according to Bittner (*6*), Murray did not observe them in his (Murray's) line of strain D animals. Mice of strains M (leaden) and C57 brown were used because it is believed they are related to the C57 black strain.

The horse- and dog-serum dispersions of dibenzanthracene [1] employed in the experiments were prepared by Dr. Egon Lorenz according to a technique reported elsewhere (*10*).

EXPERIMENTAL

Experiment 1.—On October 28, 1936, 26 strain A male and 20 strain D female mice, 3 months old, each received an intravenous injection of 0.5 mg. of dibenzanthracene in 0.5 cc. of horse serum; 2 days later each received another intravenous injection of 0.4 mg. of the hydrocarbon in 0.4 cc. of horse serum, making a total of 0.9 mg. of the carcinogen for each animal. The purpose of the experiment was to determine the susceptibility of the 2 strains to the induction of pulmonary tumors.

Between 13 and 45 weeks following injections the strain A mice were killed and all had multiple lung nodules. Four strain D mice were sacrificed 18 weeks after injection and all were tumor free. Four more were killed 26 weeks following injection; 3 had single lung tumors and one was negative for tumor. Four more were sacrificed 39 weeks after injection and all were free from tumor. Six came to autopsy 45 weeks after injection; 2 were normal and 4 had large single pulmonary tumors.

[1] 1:2:5:6-Dibenzanthracene is referred to as dibenzanthracene throughout this paper.

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The experiment demonstrates (*a*) that strain A mice are more susceptible to induced lung tumors than are mice of strain D, and (*b*) that pulmonary tumors were induced in strain D animals.

Experiment 2.—It has been shown (*2*) that subcutaneous injection of a dog-serum dispersion of dibenzanthracene is very effective for the induction of pulmonary tumors in mice. To determine the susceptibility of strains C57 brown and C57 black mice to pulmonary tumors induced by subcutaneous injection of the hydrocarbon, 3-month old female animals of each strain were injected subcutaneously in the right axilla with 0.3 mg. of dibenzanthracene in 1 cc. of dog serum on December 21, 1936; the injection was repeated 1 week later. Thus, each animal received 0.6 mg. of the carcinogen. Nine strain C57 brown and 10 C57 black mice served as test animals. The mice were autopsied when tumors appeared at the site of injection or when they died from other causes.

Of the 9 C57 brown mice, 5 had primary pulmonary tumors; 2 of the mice came to autopsy 46 weeks, one 49 weeks, and two 57 weeks after injection. Two of the C57 black mice necropsied 52 weeks after injection had primary pulmonary tumors.

The results indicate that pulmonary tumors arose in mice of strains C57 black and C57 brown after subcutaneous injection of 0.6 mg. dibenzanthracene.

Experiment 3.—It was shown in previous investigations (*3*) that lung tumors are induced in strain A mice by intravenous injection of charcoal-adsorbed dibenzanthracene. In this experiment mice of various strains were injected intravenously with charcoal-adsorbed dibenzanthracene to determine whether internal tumors could be induced. The carcinogen was adsorbed on charcoal by Dr. Egon Lorenz, as described in the previous publication (*3*). Fifty mg. of dibenzanthracene were adsorbed on 100 mg. of charcoal, which was then added to 50 cc. of sterile physiological saline, and 0.5 cc. of the suspension was injected intravenously into 3-month old female mice on January 7, 1938; each mouse received approximately 0.5 mg. of the carcinogen. The experimental animals consisted of 5 strain A, 10 strain C_3H, 12 strain C57 brown, 11 strain D, 13 strain C57 black, 12 strain C, and 8 strain M mice.

Twenty-six weeks after injection all the mice were alive. Between 26 and 52 weeks following injection 8 strain C_3H mice developed spontaneous breast tumor and were sacrificed; 6 strain C57 brown, all 11 strain D, 3 strain C57 black, 5 strain C, and 1 strain A died or were killed and all were free from lung tumor. Charcoal was present in the lungs of all these mice and stained preparations of the livers, kidneys, and spleens of some mice contained considerable amounts of charcoal. All the strain D mice had succumbed by the thirty-sixth week after injection.

One year after injection the surviving mice (2 strain C_3H, 6 C57 brown, 10 C57 black, 8 M, 7 C, and 4 A) were sacrificed. One strain C_3H mouse had a single pulmonary tumor, 1 strain C57 brown mouse had one lung tumor and 1 had 2 lung tumors, while all 4 strain A and all 7 strain C mice had lung tumors. All the other mice were tumor free, although charcoal was observed in their lungs.

In this experiment charcoal-adsorbed dibenzanthracene induced pulmonary tumors in mice of strains A and C, and perhaps in strain C57 brown, but not in mice of strains D, C57 black, or M.

Experiment 4.—Hybrid mice derived by crossing strains C57 black and D served as test animals. On June 23, 1937, strain C57 black females were mated to strain D males. The young were born between July 14 and August 12 and all were of black coat color. On October 6, 1937, 10 of the hybrids each received an intravenous injection of 1 mg. of dibenzanthracene dispersed in 1 cc. of horse serum, and 13 litter mate controls each received an intravenous injection of 1 cc. of horse serum. All the mice were kept for 9 months after injection, when they were sacrificed. Of the dibenzanthracene-injected mice 9 had from 2 to 6 pulmonary tumors in each pair of lungs and one was negative for lung tumor; the controls were free from pulmonary growths.

The results show that 1 mg. of the carcinogen, when injected intravenously, induced pulmonary tumors in the hybrid mice within 9 months after injection. Since the hybrids were derived from strains regarded as resistant to spontaneous pulmonary tumors they are included in this report as additional evidence that pulmonary tumors can be induced in mice which are resistant to the development of spontaneous lung growths.

Experiment 5.—This experiment was performed to ascertain whether intravenous injection of dibenzanthracene would induce lung tumors in strain C57 black mice. Fifteen female mice approximately 5 months of age were used. Eight were given an intravenous injection of 0.5 mg. of dibenzanthracene dispersed in 0.5 cc. of horse serum, while the remaining 7 were given 0.5 cc. of horse serum intravenously and served as controls.

Two of the dibenzanthracene-injected animals were sacrificed 28 weeks after injection and both were free from tumor. One was killed 36 weeks after injection and 2 lung nodules were found in the lungs. One died 1 week later and was too badly decomposed for autopsy records. Thirty-eight weeks after injection all surviving mice were killed. Of the 4 dibenzanthracene-injected mice, 1 was negative for tumor, 2 had single lung tumors, and 1 had 3 lung tumors. None of the 7 horse-serum-injected controls had a pulmonary tumor.

The results show that lung tumors were induced in mice of strain C57 black within 9 months after intravenous injection of 0.5 mg. of dibenzanthracene dispersed in horse serum.

DISCUSSION

The object of the investigation was to determine whether pulmonary tumors can be induced by dibenzanthracene in strains of mice which are highly resistant to spontaneous lung tumors, and the results show that such tumors can be induced in these strains. The findings do not reveal the relative susceptibilities of the four strains to induced pulmonary growths but do suggest that the intravenous injection of a definite amount of a carcinogenic hydrocarbon may yield information along these lines.

The production of pulmonary tumors in all strains of mice tested up to the present time is in harmony with the results (*4*) obtained when dibenzanthracene was injected subcutaneously into mice, for the carcinogen produced subcutaneous tumors in all strains. The strains vary in their susceptibilities to both types of induced tumors and the variation in susceptibility is determined by their genetic constitutions. Hence, it is again suggested that hereditary factors play an important part in the induction of tumors in mice by influencing the degree of susceptibility.

CONCLUSION

Parenteral administration of 1:2:5:6-dibenzanthracene induced pulmonary tumors in mice of strains D, M, C57 brown, and C57 black, and hybrids derived from the D and C57 black strains. These strains are highly resistant to the development of spontaneous pulmonary tumors.

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IX. THE INDUCTION OF PULMONARY TUMORS IN STRAIN A MICE BY INJECTION OF 2-AMINO-5-AZOTOLUENE OR 3:4:5:6-DIBENZCARBAZOLE

Pulmonary tumors have been induced in mice by the injection of carcinogenic hydrocarbons (*1*) and by skin-painting with coal tar (*7*), but the isolation of 3:4-benzpyrene from coal tar (*5*) indicates that this hydrocarbon may be the active ingredient responsible for tar-induced tumors. The object of this communication is to report the induction of pulmonary tumors in mice by two compounds which are not hydrocarbons, namely, 2-amino-5-azotoluene and 3:4:5:6-dibenzcarbazole.

2-AMINO-5-AZOTOLUENE

This compound produces malignant changes in the livers of experimental animals when fed (*6*) or injected (*8*) subcutaneously, but up to the present time has not induced tumors at the injection site. Shear (*8*) and Kinosita (*6*) have reviewed the work leading up to and following the discovery of the cancer-inducing power of 2-amino-5-azotoluene. According to Kinosita, Maruya observed metaplasia of the bronchial epithelium of rats following administration of the compound but an increase in the incidence of lung tumors in mice is not recorded.

Two experiments have been performed in which 2-amino-5-azotoluene was injected subcutaneously in the right axillary region of mice. In both experiments the compound was injected according to Shear's (*8*) technique; it was moistened with glycerol and injected by means of a trocar. The 2-amino-5-azotoluene was procured from the Eastman Kodak Co. and was used without purification.

Experiment 1.—Strain A male mice 2½ months of age served as test animals. Injections were begun during October 1937 when 14 mice each received 10 mg. of the compound. The injections were repeated at intervals of approximately one month until a total of 11 injections, or 110 mg., had been given. Three mice were sacrificed every 3 months to determine the extent of liver damage and the occurrence of internal tumors. The number of mice in which pulmonary tumors arose and the amount of compound injected are shown in table 1.

TABLE 1.—*Experiment 1. The occurrence of pulmonary tumors in strain A mice following subcutaneous injections of 2-amino-5-azotoluene*

Number of mice necropsied	Number of mice developing lung tumors	Time after first injection, in months	Amount of compound injected (mg.)	Number of mice necropsied	Number of mice developing lung tumors	Time after first injection, in months	Amount of compound injected (mg.)
1	0	2.8	20	1	0	8.7	90
3	2	3.1	30	3	3	9.1	90
3	3	6.1	60	2	2	12.0	110
1	1	7.6	80				

It is seen that of 14 strain A mice coming to autopsy between 3 and 12 months after the first injection, 11, or 78 percent, developed primary pulmonary tumors. Furthermore, the number of macroscopic tumors in each pair of positive lungs increased as the experiment progressed, i. e. each of the mice sacrificed 3.1 months after the first injection had 2 lung tumors while each of the last 2 mice killed 9 months later had 12 lung tumors. The presence of multiple tumors in the majority of the mice, together with the age of the animals, is evidence that the tumors were not spontaneous in origin.

Experiment 2.—This experiment was also begun during October 1937 when each mouse received a subcutaneous injection of 10 mg. of the compound. As in the preceding experiment the injections were repeated at monthly intervals until a total of 11 injections had been given. There were 20 strain I, 10 strain C_3H, 15 strain Y, 14 strain C, and 10 strain A mice used, all of which are susceptible to the induction of lung tumors (*2*) by carcinogenic hydrocarbons. Mice of strains A and C were 3 months old and the remaining animals 6 weeks old. The experiment was terminated one year after the time of the first injection, when all surviving mice were sacrificed.

Eighteen of the strain I mice, 2 of which had pulmonary tumors, lived until the conclusion of the experiment. Eight strain Y animals survived until approximately 11 months after the beginning of the experiment and 4 until the conclusion; 1 had a single pulmonary tumor. Nine strain C_3H mice lived throughout the experiment; all were lung-tumor free when necropsied.

The results of the injection of strain A and C mice are presented in table 2.

In table 2 it is seen that pulmonary tumors arose in strain A and strain C mice following injection of the compound. One tumor, which was found in a strain C mouse 11.9 months after the beginning of the experiment, was 9 mm. in diameter. This tumor was transplanted subcutaneously into other strain C mice and was carried through 6 serial passages.

TABLE 2.—*Experiment 2. The occurrence of pulmonary tumors in mice of strains A and C following subcutaneous injections of 2-amino-5-azotoluene*

Strain A		Strain C		Time after first injection, in months	Amount of compound injected (mg.)
Number of mice necropsied	Number of mice developing lung tumors	Number of mice necropsied	Number of mice developing lung tumors		
1	0	----------	----------	4.3	40
1	0	----------	----------	5.5	50
		1	0	8.7	80
1	1	----------	----------	8.7	80
1	1	----------	----------	9.7	90
1	0	----------	----------	9.9	100
		1	0	9.9	100
5	5	----------	----------	11.2	110
		1	1	11.8	110
		5	5	11.9	110
		6	6	12.0	110

Mice of strains A or C are more susceptible than those of strains I, C_3H, or Y to the induction of lung tumors (*2*) by 1:2:5:6-dibenzanthracene, and the results of experiment 2 suggest that the same order of susceptibility may also hold for tumors induced by this lot of 2-amino-5-azotoluene.

Attention is directed to the fact that the 2-amino-5-azotoluene used in both the experiments was a commercial preparation and the pulmonary tumors may have been induced by an impurity. The problem is receiving further consideration.

Other lesions encountered in the mice of experiments 1 and 2 following injection of the compound will be presented in a future communication; only pulmonary growths are recorded here.

3:4:5:6-DIBENZCARBAZOLE

This compound was found to be carcinogenic for mice by Boyland and Brues (*4*) who record that it evoked tumors at the site of administration and also produced hepatoma in mice. Their results have been confirmed by Strong, Smith, and Gardner (*9*). The occurrence of pulmonary tumors in mice treated with 3:4:5:6-dibenzcarbazole was not mentioned by either group of investigators. The compound used in the following experiment was obtained through the kindness of Dr. G. M. Smith of the Yale University School of Medicine.

Experiment 3.—Twenty strain A female mice, all of which were 3 months old, were used. On December 22, 1938, each received a single subcutaneous injection in the right axilla of 0.2 mg. of 3:4:5:6-dibenzcarbazole dissolved in 0.2 cc. of lard.

One mouse died 3.2 months after injection and was free from tumor. The 19 remaining mice were kept for 4.2 months, when all were sac-

rificed and necropsied. The occurrence of pulmonary tumors in these mice were as follows:

Four had no pulmonary tumor.
Four had one pulmonary tumor each.
Four had two pulmonary tumors each.
Five had three pulmonary tumors each.
Two had four pulmonary tumors each.

The mice were 7.2 months of age when killed and it is seen that 15, or 78 percent, had pulmonary tumors. This incidence is considerably higher than found in normal strain A mice of the same age and, in addition, 11 animals had more than a single macroscopic tumor within their lungs. Hence, it may be concluded that 3:4:5:6-dibenzcarbazole induced pulmonary tumors in the strain A female mice of this experiment.

DISCUSSION

Carcinogenic hydrocarbons produce tumors at the site of administration (*5*) and some, at least, are also able to induce pulmonary tumors in mice (*2*) when injected at a site distant from the lungs. There is in addition some evidence that 1:2:5:6-dibenzanthracene and 20-methylcholanthrene produce hepatoma (*3*) when administered to susceptible mice. Likewise, 3:4:5:6-dibenzcarbazole induces sarcoma in mice when injected subcutaneously and epithelioma when painted on the skin, but it is of special interest that this compound also induces hepatoma when injected subcutaneously or when painted on the skin. The feeding or injection of 2-amino-5-azotoluene produces hepatoma in mice but, in contrast to the hydrocarbons and 3:4:5:6-dibenzcarbazole, it does not induce malignancy at the site of administration.

The results presented here indicate that both 3:4:5:6-dibenzcarbazole and 2-amino-5-azotoluene, when injected subcutaneously into susceptible mice, induce pulmonary tumors. This indicates that pulmonary tumors can be evoked in certain mice by compounds which are not hydrocarbons. Induced tumors occurring after injection of either compound were similar both macroscopically and microscopically to tumors induced by hydrocarbons or arising spontaneously in strain A mice.

The susceptibility of the lungs of strain A mice to the carcinogenic activity of these compounds suggests that other known cancer-inciting agents may evoke similar tumors and that the lungs of this strain may be used as test objects for the presence of two carcinogenic agents which are not hydrocarbons.

CONCLUSION

3:4:5:6-Dibenzcarbazole and 2-amino-5-azotoluene induced pulmonary tumors when injected subcutaneously into strain A mice.

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COURT DECISION ON PUBLIC HEALTH

Statute regarding term of office of State superintendent of public health construed.—(Arizona Supreme Court; *Perkins* v. *Hughes*, 91 P.2d 261; decided June 12, 1939.) Section 2678 of the Arizona Revised Code, 1928, provided as follows:

The governor, the attorney general and the superintendent of public health shall constitute a State board of health. The governor shall be president and the attorney general vice president of such board. The governor shall appoint, by and with the advice and consent of the senate, the superintendent of public health, who shall be a practicing physician of the State, and shall hold his office for two years from the first Tuesday in April succeeding his appointment; he shall be secretary of said board and keep a record of its proceedings and of his own acts as superintendent. The board shall meet not less than once every six months at such place in the State as it may appoint.

The supreme court had presented to it the question of when the term of office of the defendant, who was appointed State superintendent of public health on May 10, 1937, expired. It was decided that the defendant's term of office did not expire until the first Tuesday in April 1940. In its opinion the court said, in part, as follows:

* * * our legislature in 1928 definitely settled the question by deleting the sentence providing for a fixed term of two years for the superintendent of health, and leaving in the section the language which clearly establishes a variable term. * * *

Since the first Tuesday in April succeeding the appointment of defendant was the first Tuesday in April 1938, and since, under the plain and unambiguous language of the present law, he holds office for two years from that date, his term will not expire until the first Tuesday in April 1940, and he is entitled to continue in possession of the office until that date, unless a vacancy occur therein sooner in a manner provided by law.

DEATHS DURING WEEK ENDED JULY 29, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 29, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,218	7,019
Average for 3 prior years	[1] 7,101	
Total deaths, first 30 weeks of year	258,664	251,255
Deaths under 1 year of age	428	548
Average for 3 prior years	[1] 511	
Deaths under 1 year of age, first 30 weeks of year	15,380	15,948
Data from industrial insurance companies:		
Policies in force	66,918,398	69,014,251
Number of death claims	11,747	12,118
Death claims per 1,000 policies in force, annual rate	9.2	9.2
Death claims per 1,000 policies, first 30 weeks of year, annual rate	10.7	9.5

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (...) represent no report, with the implication that cases or deaths may have occurr d but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 5, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median
NEW. ENG.												
Maine	0	0	2	1	------	------	2	------	97	16	25	25
New Hampshire	0	0	0	0	------	------	------	------	30	3	1	8
Vermont	0	0	0	0	------	------	------	------	188	14	13	7
Massachusetts	2	2	0	6	------	------	------	------	151	128	81	65
Rhode Island	0	0	1	0	------	------	------	------	137	18	4	7
Connecticut	0	0	1	2	------	------	3	------	65	22	13	18
MID. ATL.												
New York	8	19	15	22	[1] 1	[1] 2	1	[1] 1	94	234	323	261
New Jersey	4	3	9	5	4	3	1	1	19	16	25	73
Pennsylvania	12	24	21	18	------	------	------	------	20	40	117	132
E. NO. CEN.												
Ohio	8	11	6	13	2	8	------	1	16	21	139	79
Indiana	10	7	6	11	------	------	------	5	3	2	1	10
Illinois	4	6	18	20	1	1	3	3	10	15	25	80
Michigan [2]	5	5	12	7	12	11	------	------	44	42	157	68
Wisconsin	0	0	4	2	46	26	10	11	0	0	175	175
W. NO. CEN.												
Minnesota	2	1	2	3	------	------	------	1	29	15	41	20
Iowa	2	1	3	2	------	------	1	1	63	31	21	8
Missouri	1	1	12	10	------	------	23	23	1	1	14	14
North Dakota	15	2	1	3	87	5	1	1	0	0	12	3
South Dakota	8	1	0	0	------	------	------	------	8	1	------	0
Nebraska	8	2	1	1	------	------	5	------	4	1	8	8
Kansas	3	1	2	4	3	1	1	------	11	4	8	8

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 5, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	--	--	--	--	0	0	--	0
Maryland [3]	3	1	4	4	3	1	2	1	9	3	13	16
Dist. of Col	0	0	4	5	--	--	--	--	40	5	5	3
Virginia	51	27	15	12	30	16	--	--	66	35	46	21
West Virginia	3	1	3	3	16	6	12	14	22	8	6	11
North Carolina [3]	16	11	27	14	--	--	2	--	34	23	100	32
South Carolina [3]	22	8	9	4	183	67	63	45	0	0	9	9
Georgia [3]	27	16	18	11	30	18	--	--	30	18	--	0
Florida [3]	18	6	2	4	3	1	1	--	12	4	--	2
E. SO. CEN.												
Kentucky	19	11	4	3	14	8	3	1	3	2	5	21
Tennessee	7	4	3	7	21	12	6	6	11	6	7	10
Alabama [3]	39	22	19	13	26	15	18	3	2	1	12	8
Mississippi [2]	28	11	11	9	--	--	--	--	--	--	--	--
W. SO. CEN.												
Arkansas	12	5	10	5	12	5	24	4	7	3	18	2
Louisiana [3]	12	5	8	9	22	9	7	10	7	3	1	4
Oklahoma	6	3	3	5	8	4	29	5	6	3	6	3
Texas [3]	17	21	26	31	19	23	74	24	28	34	4	19
MOUNTAIN												
Montana	19	2	0	1	37	4	--	--	112	12	36	10
Idaho	0	0	3	0	--	--	4	1	41	4	5	4
Wyoming	22	1	0	0	--	--	--	--	153	7	3	3
Colorado	53	11	14	6	34	7	--	--	43	9	13	13
New Mexico	0	0	2	3	--	--	--	--	25	2	2	6
Arizona	12	1	5	1	49	4	10	5	25	2	9	1
Utah [2]	0	0	0	0	20	2	1	--	119	12	35	4
PACIFIC												
Washington	0	0	4	1	--	--	--	--	222	72	11	18
Oregon	0	0	1	1	15	3	9	8	134	27	15	7
California	16	19	16	16	5	6	10	10	145	177	188	91
Total	11	272	327	327	12	263	326	248	44	1,096	1,752	1,752
31 weeks	15	11,492	13,737	14,542	230	151,020	45,372	103,499	452	347,041	758,270	665,401

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	0	0	0	0	0	2	181	30	10	7
New Hampshire	0	0	0	0	0	0	0	0	0	0	2	2
Vermont	0	0	0	0	0	0	1	1	13	1	3	3
Massachusetts	0	0	1	3	2.4	2	0	5	33	28	31	38
Rhode Island	0	0	0	0	0	0	1	1	15	2	2	2
Connecticut	3	1	0	0	0	0	1	1	21	7	6	8
MID. ATL.												
New York	1.6	4	7	9	5	13	9	9	25	63	71	78
New Jersey	0	0	0	0	4	3	2	2	24	20	19	19
Pennsylvania	1.5	3	2	4	1.5	3	1	2	30	59	106	106

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 5, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0	0	0	3	2.3	3	7	3	38	50	104	59
Indiana	0	0	1	1	1.5	1	1	1	40	27	18	18
Illinois	0.7	1	2	7	2.6	4	5	10	26	40	82	91
Michigan [3]	0	0	2	1	49	46	1	8	55	52	60	60
Wisconsin	4	2	0	0	0	0	0	0	67	38	51	51
W. NO. CEN.												
Minnesota	0	0	0	0	8	4	2	4	56	29	25	25
Iowa	0	0	0	0	6	3	2	0	12	6	18	18
Missouri	0	0	0	1	0	0	1	2	6	5	27	16
North Dakota	0	0	0	0	0	0	1	0	22	3	8	4
South Dakota	0	0	0	0	0	0	1	1	53	7	8	5
Nebraska	0	0	0	0	23	6	0	0	15	4	4	4
Kansas	2.8	1	0	0	11	4	2	2	64	23	24	23
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	0	0	0	
Maryland [3]	3	1	0	0	3	1	2	2	28	9	6	12
Dist. of Col	0	0	0	1	0	0	2	1	40	5	1	1
Virginia	0	0	2	2	6	3	2	3	28	15	9	9
West Virginia	2.7	1	0	0	0	0	1	1	38	14	9	18
North Carolina [3]	4	3	2	2	2.9	2	2	3	25	17	9	16
South Carolina [3]	0	0	2	1	46	17	0	0	3	1	7	2
Georgia [3]	3	2	0	1	8	5	2	2	18	11	11	7
Florida [3]	0	0	2	0	3	1	1	0	30	10	4	2
E. SO. CEN.												
Kentucky	3	2	4	3	3	2	0	4	42	24	13	16
Tennessee	1.8	1	0	1	5	3	2	3	16	9	11	13
Alabama [3]	1.8	1	2	1	1.8	1	1	3	25	14	6	9
Mississippi [3]	2.5	1	0	0	2.5	1	4	4	25	10	8	5
W. SO. CEN.												
Arkansas	2.5	1	0	0	10	4	2	1	20	8	3	3
Louisiana [3]	0	0	0	0	0	0	0	2	19	8	5	5
Oklahoma	0	0	0	0	0	0	0	0	16	8	6	6
Texas [3]	4	5	2	1	12	14	4	4	12	14	35	31
MOUNTAIN												
Montana	0	0	1	0	0	0	1	1	37	4	8	4
Idaho	0	0	0	0	0	0	2	1	10	1	3	2
Wyoming	0	0	0	0	0	0	0	0	0	0	3	5
Colorado	0	0	0	0	5	1	0	1	82	17	9	12
New Mexico	12	1	0	0	12	1	0	0	49	4	4	3
Arizona	0	0	0	0	37	3	0	0	0	0	1	1
Utah [3]	0	0	0	0	0	0	0	0	70	7	6	6
PACIFIC												
Washington	0	0	0	0	3	1	0	1	12	4	18	10
Oregon	0	0	0	0	5	1	0	1	85	7	4	9
California	0.8	1	1	2	47	57	0	19	30	36	49	50
Total	1.3	33	33	66	8	210	66	250	30	751	927	939
31 weeks	1.7	1,321	2,072	4,027	2	1,544	794	2,315	148	115,033	135,656	163,175

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 5, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases	1934–38, median	Aug. 5, 1939, rate	Aug. 5, 1939, cases	Aug. 6, 1938, cases
NEW ENG.											
Maine	0	0	0	0	12	2	2	3	223	37	13
New Hampshire	0	0	0	0	0	0	0	0	0	0	1
Vermont	0	0	0	0	27	2	0	0	0	0	35
Massachusetts	0	0	0	0	1	1	2	3	135	115	103
Rhode Island	0	0	0	0	0	0	1	0	84	11	14
Connecticut	0	0	0	0	18	6	3	2	172	58	58
MID. ATL.											
New York	0	0	0	0	5	13	24	18	192	480	579
New Jersey	0	0	0	0	8	7	7	7	311	261	319
Pennsylvania	0	0	0	0	11	21	15	25	265	523	436
E. NO. CEN.											
Ohio	1	1	3	0	16	21	30	30	128	166	444
Indiana	0	0	6	0	10	7	24	18	114	77	7
Illinois	5	7	2	0	18	27	18	19	215	328	491
Michigan [2]	4	4	1	0	1	1	4	6	240	227	279
Wisconsin	0	0	2	3	5	3	3	3	364	207	364
W. NO. CEN.											
Minnesota	2	1	1	1	6	3	0	2	74	38	51
Iowa	8	4	6	3	10	5	9	4	63	31	24
Missouri	0	0	2	1	36	28	10	20	32	25	28
North Dakota	0	0	0	0	0	0	0	2	66	9	16
South Dakota	15	2	0	4	0	0	2	1	8	1	5
Nebraska	8	2	2	2	0	0	0	1	34	9	10
Kansas	3	1	1	0	14	5	5	15	53	19	83
SO. ATL.											
Delaware	0	0	0	0	79	4	0	1	138	7	1
Maryland [2]	0	0	0	0	28	9	13	13	191	62	37
Dist. of Col.	0	0	0	0	0	0	0	2	234	29	10
Virginia	0	0	0	0	43	23	19	36	257	137	48
West Virginia	0	0	0	0	38	14	5	15	94	35	19
North Carolina [3]	0	0	0	0	19	13	18	25	146	100	181
South Carolina [3]	0	0	0	0	38	14	20	20	52	19	76
Georgia [3]	2	1	0	0	46	28	43	43	96	58	26
Florida [3]	0	0	0	0	9	3	5	5	48	16	17
E. SO. CEN.											
Kentucky	0	0	1	0	68	39	46	46	68	39	53
Tennessee	0	0	1	0	19	11	40	43	104	59	49
Alabama [3]	0	0	0	0	33	19	26	19	51	29	38
Mississippi [2]	0	0	0	0	33	13	13	18	------	------	------
W. SO. CEN.											
Arkansas	2	1	2	0	94	38	29	29	17	7	8
Louisiana [3]	0	0	0	0	36	15	13	23	247	102	49
Oklahoma	0	0	1	0	38	19	19	23	12	6	18
Texas [3]	0	0	3	0	47	57	83	83	65	79	150
MOUNTAIN											
Montana	0	0	0	2	9	1	0	3	84	9	67
Idaho	0	0	2	2	10	1	6	1	41	4	4
Wyoming	22	1	0	0	65	3	0	1	131	6	4
Colorado	0	0	5	0	10	2	2	2	106	22	45
New Mexico	25	2	0	0	25	2	6	7	185	15	13
Arizona	0	0	0	0	25	2	0	2	74	6	16
Utah [2]	0	0	0	0	10	1	0	1	526	53	52
PACIFIC											
Washington	0	0	6	5	6	2	2	2	43	14	64
Oregon	0	0	5	2	10	2	2	2	70	14	37
California	6	7	25	3	8	10	13	13	122	149	186
Total	1	34	77	52	20	497	582	687	149	3,698	4,628
31 weeks	11	8,610	12,603	6,001	8	6,097	6,980	6,980	158	120,862	134,900

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended August 5, 1939, 139 cases as follows: North Carolina, 8; South Carolina, 9; Georgia, 62; Florida, 8; Alabama, 34; Louisiana, 1; Texas, 17.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Aug. 12, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	Week ended July 22	Week ended July 29	Week ended Aug. 5	Week ended Aug. 12
Eastern:									
New York				3	3				1
New Jersey				4	8	1	2	3	1
Pennsylvania				6	3	1		2	1
Delaware				3					
Maryland			7	13	11	5	2	11	5
District of Columbia			2	2	2	1	1		1
Virginia			1	13	10	1	4	3	3
West Virginia									1
North Carolina				3	13	5	2	4	2
Georgia					1		1		
Central:									
Ohio				3	2		2	2	
Indiana				2	1			1	2
Illinois			1	1	5	2		1	4
Tennessee[1]					5	4	1		
Iowa			1	10	9	2		2	2
Missouri				1			3	1	
Western:									
Montana	[2]2	2	8	5	1		1		1
Idaho		4	7	4	5				
Wyoming		3	14	16	5	3		2	
Colorado		2	3	9	4				
Utah		2	5	5	6	2			
Washington		2	3	2					
Oregon		9	16	7	2				1

[1] Report has been received of change of diagnosis in certain cases previously reported in Tennessee.
[2] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
June 1939										
Utah	1	5		312	1		1	35	6	3
Virginia	30	86	13	1,763	4	15	2	41	0	28
Wisconsin	1	59		1,386	4		0	225	2	4
July 1939										
Connecticut	2	4	1	415	2		3	50	0	6
Iowa	9	1	20	271	1		1	58	53	22
Maine	3	1		171	0		1	80	0	13
Missouri	18		41	15	2		6	59	32	58
Pennsylvania	57		1	262	18		9	406	0	37
Texas	72	193	844	402	7	160	45	74	7	218

June 1939

	Cases
Chickenpox:	
Utah	163
Virginia	230
Wisconsin	946
Dysentery:	
Virginia (amoebic)	1
Virginia (bacillary)	651
German measles:	
Utah	18
Wisconsin	31
Mumps:	
Utah	435
Virginia	190
Wisconsin	663

June 1939—Continued

	Cases
Rocky Mountain spotted fever:	
Utah	4
Virginia	12
Septic sore throat:	
Utah	1
Virginia	49
Wisconsin	6
Tetanus:	
Virginia	1
Trachoma:	
Wisconsin	1

June 1939—Continued

	Cases
Tularaemia:	
Utah	8
Virginia	3
Wisconsin	1
Typhus fever:	
Virginia	2
Undulant fever:	
Utah	4
Virginia	2
Wisconsin	16
Whooping cough:	
Utah	238
Virginia	368
Wisconsin	704

Summary of monthly reports from States—Continued

July 1939

	Cases
Actinomycosis:	
Connecticut	1
Anthrax:	
Texas	1
Chickenpox:	
Connecticut	94
Iowa	46
Maine	79
Missouri	22
Pennsylvania	558
Texas	129
Conjunctivitis, infectious:	
Connecticut	1
Dengue:	
Texas	8
Dysentery:	
Connecticut (amoebic)	1
Connecticut (bacillary)	3
Iowa (bacillary)	2
Missouri	17
Pennsylvania (amoebic)	1
Texas (amoebic)	7
Texas (bacillary)	497
Encephalitis, epidemic or lethargic:	
Iowa	2
Pennsylvania	3
Texas	2

July 1939—Continued

	Cases
German measles:	
Connecticut	5
Maine	12
Pennsylvania	32
Impetigo contagiosa:	
Missouri	40
Leprosy:	
Texas	1
Mumps:	
Connecticut	95
Iowa	42
Maine	27
Missouri	102
Pennsylvania	440
Texas	112
Ophthalmia neonatorum:	
Pennsylvania	4
Texas	3
Rabies in animals:	
Iowa	1
Rabies in man:	
Missouri	1
Relapsing fever:	
Texas	6
Rocky Mountain spotted fever:	
Iowa	6
Missouri	3
Pennsylvania	2

July 1939—Continued

	Cases
Septic sore throat:	
Connecticut	21
Iowa	3
Maine	1
Missouri	1
Trachoma:	
Missouri	80
Texas	2
Tularaemia:	
Iowa	5
Missouri	4
Texas	6
Typhus fever:	
Texas	64
Undulant fever:	
Connecticut	5
Iowa	18
Maine	5
Missouri	2
Pennsylvania	2
Texas	43
Vincent's infection:	
Maine	1
Whooping cough:	
Connecticut	214
Iowa	136
Maine	127
Missouri	196
Pennsylvania	1,962
Texas	579

WEEKLY REPORTS FROM CITIES

City reports for week ended July 29, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	97	30	12	760	307	319	5	362	71	1,436	-------
Current week [1]	62	36	13	369	203	219	2	365	53	1,436	-------
Maine:											
Portland	0	------	0	0	0	0	0	0	0	6	17
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	11
Manchester	0	------	0	0	0	2	0	0	0	0	30
Nashua	0	------	0	4	0	0	0	0	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	4
Burlington	0	------	0	1	0	0	0	0	0	0	5
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	1	------	0	15	10	13	0	7	0	29	163
Fall River	0	------	0	0	2	0	0	2	0	3	29
Springfield	0	------	0	1	1	1	0	0	0	8	24
Worcester	0	------	0	11	6	1	0	1	0	14	36
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	19
Providence	0	------	0	27	2	0	0	1	0	19	48
Connecticut:											
Bridgeport	1	------	0	8	0	1	0	0	0	0	29
Hartford	0	------	0	0	0	0	0	0	0	11	35
New Haven	0	------	0	8	1	0	0	1	0	9	27
New York:											
Buffalo	2	------	0	2	2	7	0	6	1	22	117
New York	7	3	1	24	28	29	0	76	3	137	1,246
Rochester	0	------	0	8	3	1	0	0	0	11	67
Syracuse	0	------	0	2	2	0	0	0	0	72	47
New Jersey:											
Camden	0	------	0	0	2	3	0	0	0	3	25
Newark	0	------	0	2	2	2	0	6	2	54	89
Trenton	0	------	0	0	0	0	0	1	0	5	25

[1] Figures for Springfield, Ill. estimated; report not received.

City reports for week ended July 29, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Pennsylvania:											
Philadelphia	1	2	1	21	6	10	0	24	8	167	414
Pittsburgh	2	------	1	1	6	8	0	2	1	36	108
Reading	0	------	0	1	0	0	0	3	1	0	23
Scranton	0	------	------	2	------	0	0	------	0	2	------
Ohio:											
Cincinnati	1	------	0	1	0	2	0	7	0	21	95
Cleveland	1	3	1	4	2	5	0	8	0	56	156
Columbus	0	------	0	0	1	1	0	1	0	4	67
Toledo	0	------	0	6	1	4	0	3	0	38	82
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	4
Fort Wayne	0	------	0	0	0	2	0	1	0	0	22
Indianapolis	1	------	0	1	2	3	0	2	0	72	79
South Bend	0	------	0	1	2	0	0	0	0	26	12
Terre Haute	0	------	0	0	1	2	0	1	0	0	20
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	14
Chicago	8	3	1	2	10	32	0	30	1	142	566
Elgin	0	------	0	0	0	0	0	0	0	5	7
Moline	0	------	0	0	0	0	0	0	0	7	7
Springfield	------	------	------	------	------	------	------	------	------	------	------
Michigan:											
Detroit	3	------	1	9	4	11	0	21	0	82	241
Flint	0	------	0	9	1	2	0	0	0	2	28
Grand Rapids	0	------	2	1	0	3	0	0	0	2	21
Wisconsin:											
Kenosha	0	------	0	0	0	4	0	0	0	1	10
Madison	0	------	0	10	0	2	0	0	0	14	11
Milwaukee	0	------	0	0	0	8	0	2	0	20	78
Racine	0	------	0	0	0	2	0	0	0	1	11
Superior	0	------	0	1	0	1	0	0	0	0	5
Minnesota:											
Duluth	0	------	0	2	2	0	0	0	1	3	17
Minneapolis	0	------	0	2	1	2	1	4	0	24	83
St. Paul	0	1	1	1	3	1	0	3	0	29	53
Iowa:											
Cedar Rapids	0	------	------	2	------	0	0	------	1	1	------
Davenport	0	------	------	0	------	0	0	------	1	2	------
Des Moines	0	------	0	0	0	5	1	0	1	0	34
Waterloo	0	------	------	0	------	2	0	------	0	6	------
Missouri:											
Kansas City	0	------	0	0	2	1	0	1	1	2	81
St. Joseph	0	------	0	0	2	0	0	1	0	0	18
St. Louis	0	------	0	0	4	3	0	12	2	25	180
North Dakota:											
Fargo	1	------	0	0	0	0	0	0	0	0	6
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	1	------	0	0	0	0	0	0	0	0	1
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	1	------
Sioux Falls	1	------	0	0	0	3	0	0	0	0	11
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	17	------
Omaha	0	------	0	2	9	0	0	2	0	6	205
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	9
Topeka	0	------	0	0	2	2	0	0	1	1	28
Wichita	1	------	0	0	0	1	0	4	0	3	32
Delaware:											
Wilmington	0	------	0	3	0	3	0	0	0	2	23
Maryland:											
Baltimore	2	2	2	1	5	3	0	11	1	50	188
Cumberland	0	------	0	1	0	2	0	0	1	1	13
Frederick	0	------	0	0	0	0	0	0	0	3	3
District of Columbia:											
Washington	5	------	0	9	11	3	0	13	2	44	157
Virginia:											
Lynchburg	3	------	0	4	0	8	0	0	0	25	13
Norfolk	0	------	0	0	0	0	0	1	0	0	17
Richmond	1	------	0	4	1	0	0	1	2	3	46
Roanoke	0	------	0	10	0	0	0	1	1	1	23
West Virginia:											
Charleston	0	------	0	0	0	0	0	0	0	0	36
Wheeling	------	------	0	------	0	2	------	2	------	7	16

City reports for week ended July 29, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	2	------	0	0	0	0	0	1	0	3	13
Wilmington	0	------	0	1	0	0	0	0	0	0	11
Winston-Salem	0	------	0	0	0	1	0	2	0	0	21
South Carolina:											
Charleston	0	9	0	0	0	1	0	3	5	0	26
Florence	0	------	0	0	2	0	0	0	0	0	12
Greenville	0	------	0	0	1	1	0	0	0	2	11
Georgia:											
Atlanta	0	------	0	0	5	0	0	9	2	0	89
Brunswick	0	------	0	0	0	0	0	0	0	0	1
Savannah	0	8	0	2	0	0	0	2	1	0	25
Florida:											
Miami	0	------	0	0	2	1	0	2	0	0	30
Tampa	1	------	0	2	0	1	0	0	0	0	20
Kentucky:											
Ashland	0	------	0	0	0	0	0	1	1	0	5
Covington	0	------	0	0	0	0	0	0	1	0	13
Lexington	0	------	0	1	0	0	0	1	0	1	18
Louisville	0	------	0	0	3	1	0	2	0	35	58
Tennessee:											
Knoxville	0	------	0	0	1	1	0	1	0	0	19
Memphis	0	------	0	0	2	1	0	9	2	25	95
Nashville	1	------	0	0	3	1	0	0	1	11	42
Alabama:											
Birmingham	0	2	0	0	4	0	0	3	0	6	78
Mobile	0	------	0	0	2	0	0	1	0	5	27
Montgomery	0	------	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	1	0	------
Little Rock	0	------	0	0	1	0	0	0	0	2	17
Louisiana:											
Lake Charles	0	------	0	1	0	0	0	0	0	0	5
New Orleans	0	1	0	0	9	1	0	10	2	0	132
Shreveport	0	------	0	0	4	0	0	3	0	2	42
Oklahoma:											
Oklahoma City	1	------	0	0	2	1	0	0	0	0	37
Texas:											
Dallas	4	------	0	1	2	2	0	5	0	2	56
Fort Worth	0	------	0	1	4	0	0	1	0	0	34
Galveston	0	------	0	0	0	0	0	5	0	0	18
Houston	1	------	0	1	2	0	0	6	3	6	69
San Antonio	0	------	1	0	4	0	0	12	2	0	89
Montana:											
Billings	0	------	0	0	0	0	0	0	0	3	8
Great Falls	0	------	0	8	1	3	0	0	0	0	8
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	1	0	1	0	0	0	0	6
Idaho:											
Boise	0	------	0	1	2	0	0	0	0	0	7
Colorado:											
Colorado Springs	0	------	0	0	0	5	0	1	0	0	11
Denver	6	------	0	2	1	5	0	6	1	20	68
Pueblo	0	------	0	1	0	0	0	0	0	12	4
New Mexico:											
Albuquerque	0	------	0	0	0	1	0	2	3	0	8
Utah:											
Salt Lake City	0	------	0	5	0	2	0	2	0	22	25
Washington:											
Seattle	0	------	1	89	2	2	0	2	0	3	84
Spokane	0	------	0	2	0	0	0	0	2	0	27
Tacoma	0	------	0	6	0	0	0	3	0	0	35
Oregon:											
Portland	0	------	0	5	1	1	0	1	0	2	63
Salem	0	------	------	3	------	0	0	------	0	0	------
California:											
Los Angeles	5	2	0	40	13	20	0	18	1	16	308
Sacramento	0	------	0	4	0	2	1	1	2	2	19
San Francisco	1	------	0	2	4	3	0	4	0	2	155

City reports for week ended July 29, 1939—Continued

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Polio-myelitis cases	State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Polio-myelitis cases
New York:				Kansas:			
New York	1	1	7	Wichita	0	0	1
Rochester	0	0	1	District of Columbia:			
Pennsylvania:				Washington	1	0	0
Philadelphia	1	0	2	South Carolina:			
Pittsburgh	0	0	1	Charleston	0	0	5
Scranton	1	0	0	Georgia:			
Ohio:				Savannah	0	0	1
Toledo	0	0	1	Florida:			
Indiana:				Tampa	0	0	1
South Bend	1	0	0	Kentucky:			
Illinois:				Lexington	0	0	1
Chicago	0	0	3	Tennessee:			
Michigan:				Memphis	0	1	0
Detroit	0	0	31	Alabama:			
Minnesota:				Birmingham	1	1	0
Minneapolis	0	0	1	Utah:			
Iowa:				Salt Lake City	0	0	1
Des Moines	0	0	1	California:			
North Dakota:				Los Angeles	0	0	4
Fargo	0	0	1				
Nebraska:							
Omaha	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Rochester, 1; St. Louis, 1; Birmingham, 1; Salt Lake City, 1.

Pellagra.—Cases: Boston, 2; Baltimore, 1; Charleston, S. C., 3; Savannah, 8; Memphis, 1; Nashville, 2; Birmingham, 1.

Typhus fever.—Cases: New York, 1; Wilmington, N. C., 1; Charleston, S. C., 2; Atlanta, 1; Brunswick, 1; Savannah, 8; Miami, 1; Mobile, 2; Houston, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 15, 1939.—During the week ended July 15, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Bruns-wick	Quebec	Ontario	Mani-toba	Sas-katch-ewan	Alberta	British Colum-bia	Total
Chickenpox		5		57	98	40	20	26	28	274
Diphtheria		2	4	24		5	1			36
Dysentery				1	1					2
Influenza									6	6
Measles		31	7	268	418	30	5	7	4	770
Mumps				11	22	11		6	4	54
Pneumonia		8			8				4	20
Poliomyelitis					2	1				3
Scarlet fever	2	1	13	36	52	7		9	4	124
Trachoma							2			2
Tuberculosis	1	27	4	75	70	3		1		181
Typhoid fever		2	2	10	5					19
Whooping cough		18		84	90	19	49	82	27	369

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS for July 28, 1939, pages 1409–1421. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Argentina—Anchorena.—During the period July 16 to 31, 1939, 1 case of plague, with 1 death, was reported at Anchorena, Argentina.

Smallpox

Italy—Sicily—Palermo.—During the two weeks ended July 15, 1939, 13 cases of smallpox were reported in Sicily, including 4 cases at Palermo.

Spain.—During the week ended June 17, 1939, 1 case of smallpox was reported at Valencia, and 1 imported case of the disease was reported at Barcelona during the week ended July 8.

Yellow Fever

Colombia—Department of Antioquia—Caracoli.—During the week ended July 1, 1939, 1 death from yellow fever was reported at Caracoli, Colombia.

Cameroon—Bafia.—Report was received under date of August 3, 1939, of 1 case of yellow fever at Bafia, Cameroon.

Nigeria—Ikot Ekpene.—On July 24, 1939, 1 case of yellow fever was reported at Ikot Ekpene, Nigeria.

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Public Health Reports

VOLUME 54 **AUGUST 25, 1939** NUMBER 34

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

During the week ended August 19, 343 cases of poliomyelitis were reported in the United States, as compared with 261 cases for the preceding week, and with a median figure of 335 cases for the corresponding week of the 5-year period 1934–38. This is the first week during the year in which the number of cases reported has exceeded the median, the figure which represents the number of cases which might normally be expected at this season of the year.

The States reporting the largest numbers of cases were as follows: Michigan 87 cases (of which 64 were in Detroit); California 55 (with 15 cases in Los Angeles); Minnesota 39 (of which 11 were in Minneapolis); New York 39 (with 14 cases reported from Buffalo and 16 from New York City); Pennsylvania 15; South Carolina 15; Illinois 13; New Jersey 12; and Texas 11 cases. Over three-fourths of the reported cases occurred in these 9 States. Sixteen States reported no cases, and 9 States reported only 1 case.

NATURAL INFECTION OF *Triatoma gerstakeri* WITH *Trypanosoma cruzi* IN TEXAS [1]

By Ardzroony Packchanian, *Protozoologist, United States Public Health Service*

INTRODUCTION

Trypanosoma cruzi was isolated by Chagas in 1907 in Brazil and described by him in 1909. He proved that this parasite is the causative agent of the disease which now bears his name (*1, 2, 15*).

American trypanosomiasis, or Chagas' disease, has been thought to be confined to South America (Argentina, Brazil, Guatemala, Paraguay, Peru, Salvador, Uruguay, and Venezuela) (*3, 5, 8*), and Panama (*10*).

The transmission of this disease in man and in animals takes place naturally through an intermediate host, usually a reduviid

[1] From the Division of Infectious Diseases, National Institute of Health.

bug (*Triatoma, Rhodnius*). About 46 species of *Triatoma* have been identified and reported thus far throughout the world. Of these, 15 species are known to exist in several States of the United States (*4, 9, 14*). Two species of these reduviid bugs, *Triatoma protracta* and *Triatoma uhleri*, are known to be naturally infected with *Trypanosoma cruzi* in Arizona and California (*6, 7*). The present study adds another species, namely, *Triatoma gerstakeri*, within the United States naturally infected with *Tr. cruzi* and capable of transmitting *Tr. cruzi* infection in man and animals.

METHOD AND MATERIAL

Field studies.—For the purposes of collecting live specimens of various species of *Triatoma*, and of studying their epidemiological significance, two field studies were conducted by the writer in the State of Texas, during October 1937 and September 1938. The work was conducted principally in the cities of Austin, Dallas, Galveston, Houston, and San Antonio, and in Bell, DeWitt, Duval, Live Oak, and Wells Counties.

It was learned that *Triatoma*, which is locally known as "blood sucker," "Mexican bed-bug," and "kissing bug," is widely distributed in the State of Texas and has become a household pest in certain localities. Three species of *Triatoma* were found, *T. gerstakeri*, *T. heidmanni*, and *T. sanguisuga*. (The author is indebted to Mr. H. Barber, U. S. Department of Agriculture, for the identification.) The former species, *T. gerstakeri*, was found chiefly in Live Oak County. Apparently, adult reduviid bugs are very common during May, June, and July, not only in Live Oak County but also in the nearby counties.

Large numbers of *Triatoma gerstakeri* were found on a farm about 15 miles from the town of Three Rivers. Adults were seen in the house and barn, while the nymphs were located in the nests of wood rats (*Neotoma micropus micropus*). A housewife in this community stated that she and members of her family had killed 300 or more "blood suckers" every night for 6 weeks and that the bugs had been abundant every summer.

More than 500 persons who had been bitten by these bugs at one time or another were found by personal inquiries. The bug sucks a considerable amount of blood at each feeding. Chickens, cows, hogs, and human beings are the most common victims.

Over 100 live *Triatoma gerstakeri*, which represent the material for the present study, were collected on one farm, near Three Rivers, while many live specimens have been sent to the writer from time to time from the same area. Most of the adult bugs were collected at night in and around the house. (See figs. 1, 2, and 3.)

Demonstration of the natural infection of Triatoma *with trypanosomes.*—With a slight pressure on the abdomen of the insect, droplets of fecal excretion were obtained and examined microscopically in cover-glass preparations. The saliva of the insect was obtained by a slight pressure of forceps over the thorax and head. The small droplet of liquid obtained from the proboscis was likewise examined microscopically. Occasionally one or more insects were sacrificed and their intestinal contents were suspended in physiological salt solution for animal inoculation purposes and for smears. The smears were fixed in absolute alcohol for five minutes and stained by Novy's modification of Romanowsky's stain.

Experimental animals and methods of inoculation.—Mice, guinea pigs, and rhesus monkeys were inoculated with the intestinal contents of insects suspended in salt, Ringer's, or Tyrode solution. The mice were inoculated intraperitoneally, the guinea pigs and the monkeys subcutaneously. Blood samples were obtained from the monkeys before inoculation for cultural studies to eliminate the possibility of natural trypanosomiasis.

Subinoculation into mice and guinea pigs was made by using about two drops of blood from an infected animal in about 0.5 cc. of salt solution.

Microscopic examination of the blood for demonstration of infectivity of test animals.—Samples of blood from the tails of mice and from the ears of guinea pigs and monkeys were examined microscopically in cover-glass preparations (objectives 21X and 45X, ocular 10X) and results were recorded at the end of about 5 minutes' search. Occasionally blood obtained from the heart was used for this purpose.

Culture in vitro.—The blood obtained from the heart of experimentally infected animals was defibrinated and a few drops introduced into N. N. tubes (agar slants containing from 20 to 30 percent defibrinated rabbit's blood). The tubes were sealed by rubber caps and incubated at 25° C. from 1 to 6 weeks. Subcultures from positive tubes were made monthly.

Staining of trypanosomes.—At various intervals, smears were made from cultures and from the blood of experimental animals as well as from the intestinal content of insects. These were fixed in absolute alcohol from 3 to 5 minutes, or in equal volumes of ethyl alcohol and ether for 5 minutes, and by osmic acid vapor for 10 seconds, and stained by Leishman's stain and by Novy's modification of Romanowsky's stain.

Microscopic pathology.[3]—The organs and tissues of test animals (usually the heart) were fixed in 10 percent formalin. After fixation

[3] The writer is indebted to Dr. Ralph D. Lillie and Dr. L. L. Ashburn, Division of Pathology, for their cooperation in this work and reports of histopathological findings.

and dehydration, the tissues were embedded in paraffin and sections were stained by Lillie's modification of Romanowsky's stain.

EXPERIMENTAL DATA

Natural infection of Triatoma gerstakeri *with trypanosomes.*—Of 100 live *Triatoma gerstakeri* collected at Three Rivers, Tex., 92 percent were found to be naturally infected with trypanosomes. The flagellates were readily demonstrable by microscopic examination in the material from the intestines and in the fecal excretions, but were never found in the saliva. The flagellates as seen in the material from the intestines of naturally infected *Triatoma gerstakeri* were chiefly crithidia and herpetomonas forms; occasionally metacyclic trypanosome forms with complete but narrow undulating membranes were also seen. These forms as observed in cover-glass and stained preparations were indistinguishable from stained and live specimens of *Trypanosoma cruzi* encountered in experimentally infected *Triatoma megista* and *Triatoma sanguisuga* (fig. 4).

Demonstration of Trypanosoma cruzi *in the blood of experimentally infected animals.*—Forty-four animals—34 mice (27 *Mus musculus*, 4 *Peromyscus eremicus eremicus*, and 3 *P. leucopus noveboracensis*), 8 guinea pigs, and 2 monkeys (*Macacus rhesus*)—were inoculated with the fecal material from different lots of *Triatoma gerstakeri*. Each series of studies included from 2 to 10 animals. All the insects came from the same locality, namely, Three Rivers, Tex. Microscopic examinations of the blood from experimentally inoculated animals were performed occasionally; the trypanosomes were demonstrated in peripheral blood at one time or another in 18 out of 44 animals. They were not found in large numbers in the peripheral circulation. The largest number seen in a given cover-glass preparation (objective 45X, ocular 10X) was about 4 trypanosomes per microscopic field. At times no trypanosomes were demonstrable during 5 minutes of microscopic search, even though previous or later examinations had shown a few. Such negative results, which are noted in the table as "0," indicate that trypanosomes were not found during 5 minutes of search. A longer period of observation, or the examination of another preparation from the same animal within the same hour, occasionally revealed scanty numbers of parasites. The flagellates were usually demonstrable in the peripheral blood beginning the second week following the inoculation and were likewise demonstrable at various intervals in the blood of the animals for 7 months following the inoculation (table 1).

The trypanosomes which were seen in the blood of mice, guinea pigs, and monkeys were similar in morphology to Brazilian strains of *Tr. cruzi* isolated directly from human beings (fig. 5). *Tr. cruzi* are usually curved and stumpy, and their movement, unlike *Tr. brucei* or *Tr. lewisi*, is twisting and reversal in character giving rise to shapes

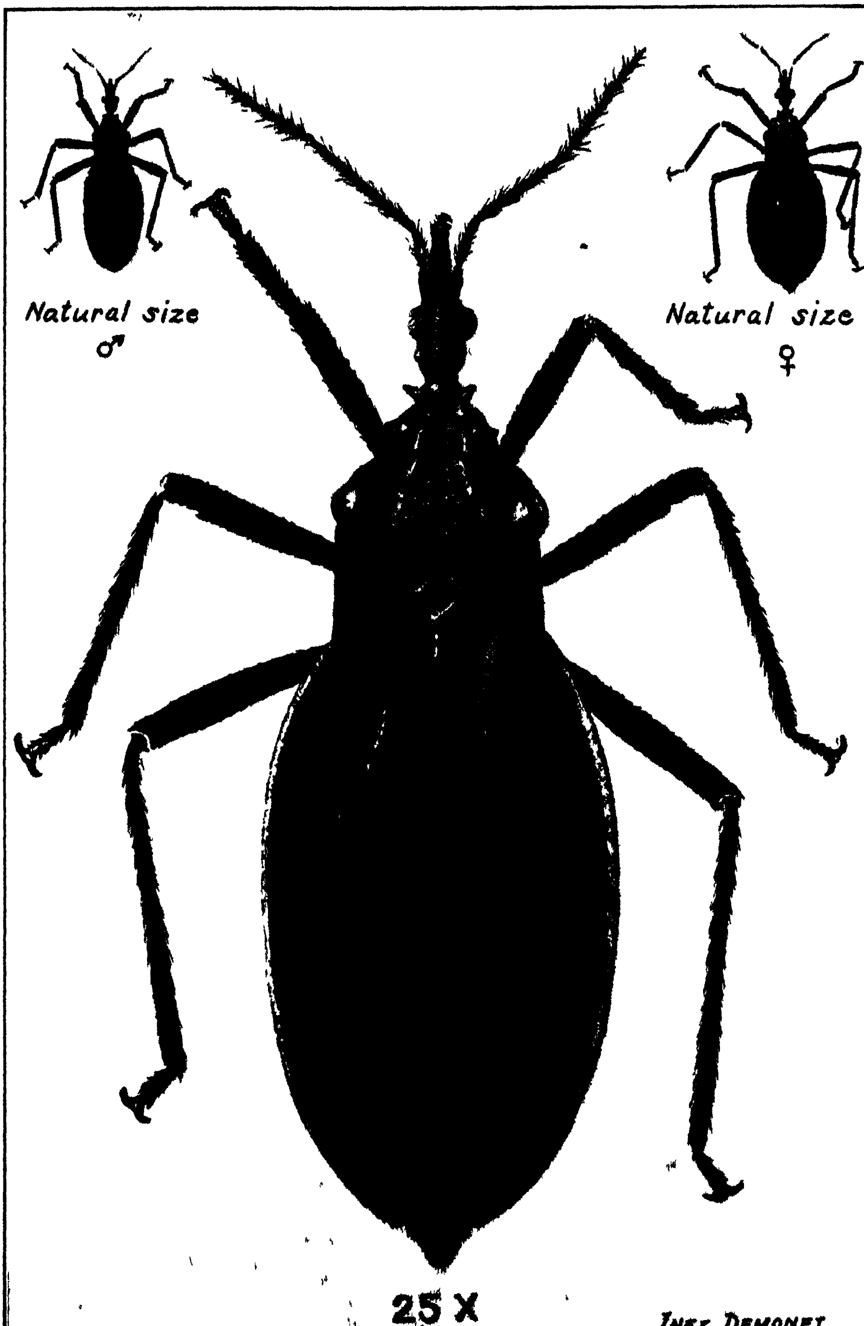

FIGURE 1.—*Triatoma gerstakeri.* (Reproduction from colored drawing.)

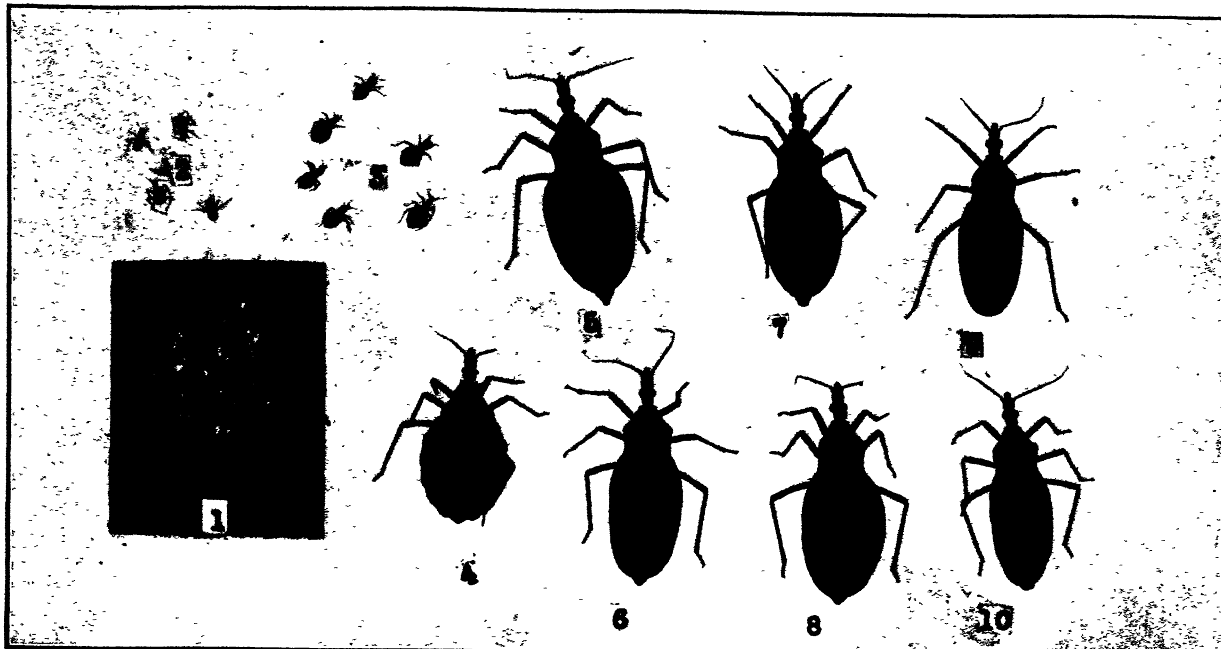

FIGURE 2.—*Triatoma gerstakeri* (photographed natural size). 1, Eggs; 2, newly hatched nymphs; 3, young nymphs after blood meal; 4, large nymph; 5, 6, 7, 8, adult females; and 9, 10, adult males.

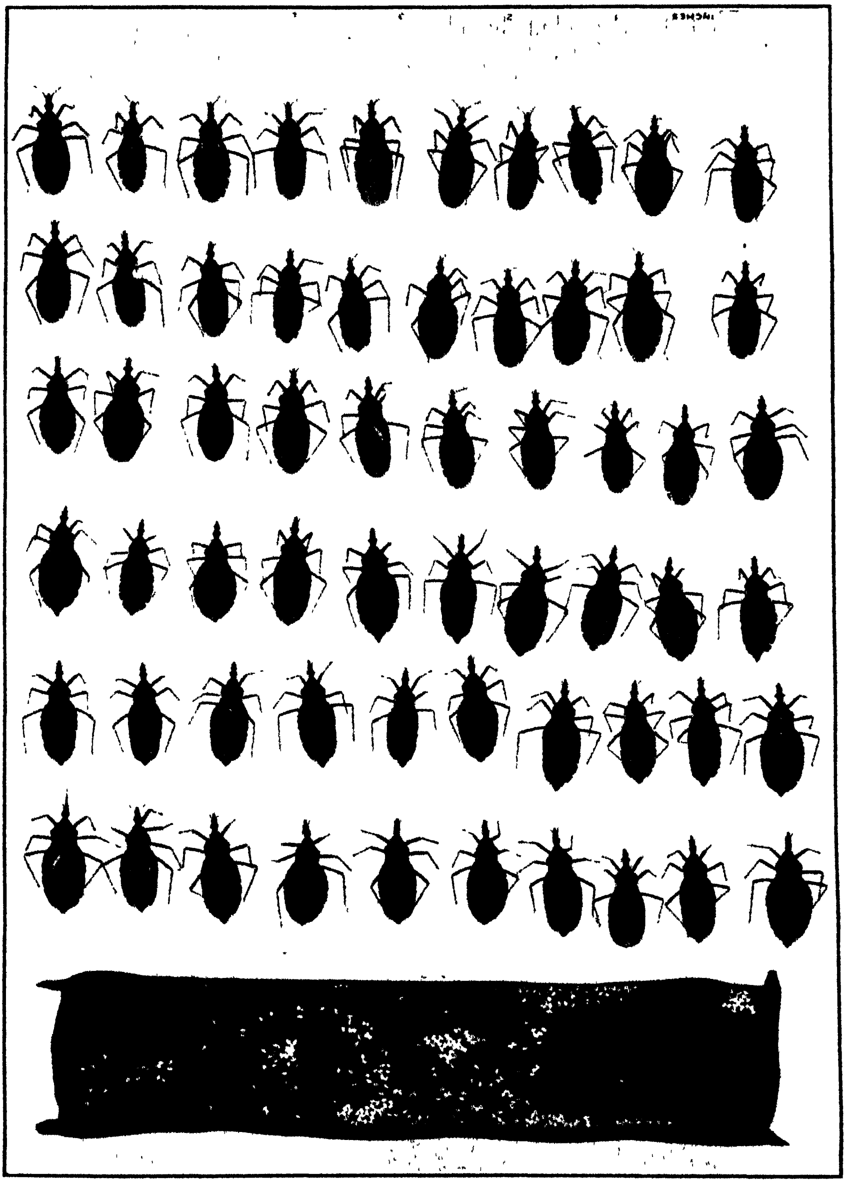

FIGURE 3.—Sixty specimens of adult *Triatoma gerstakeri* (30 ♂ and 30 ♀) and a number of eggs of *T. gerstakeri*. Sizes reduced to the scale. Note slight individual variations in size.

FIGURE 4.—Smears of intestinal contents of a few *Triatoma gerstakeri*, naturally infected with *Trypanosoma cruzi*. Leishman's stain (× 1,600). Note metacyclic trypanosome forms, crithidia, and dividing forms (14 microscopic fields).

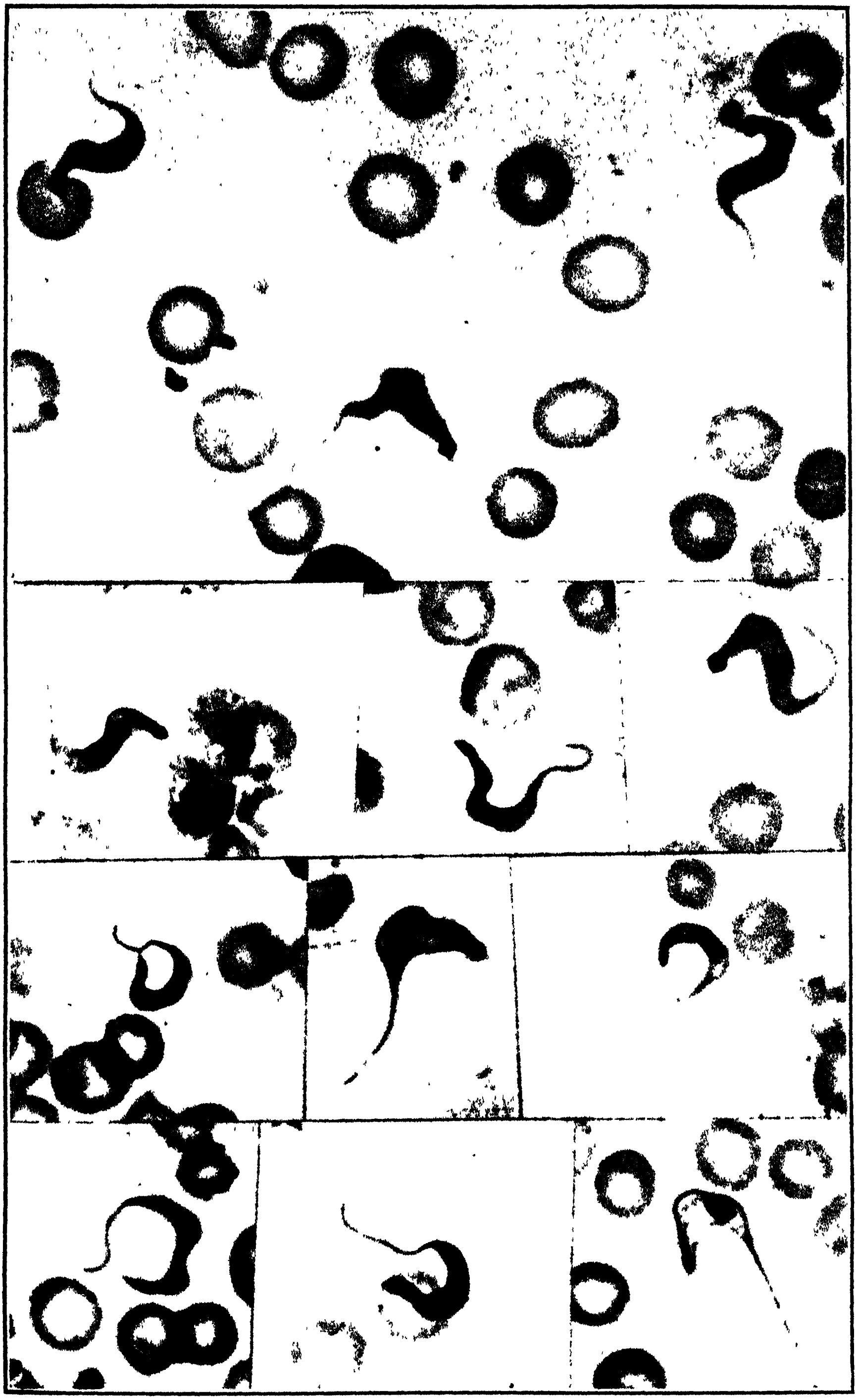

FIGURE 5.—*Trypanosoma cruzi* (× 1,600). Blood smears from two mice experimentally infected with the intestinal contents of naturally infected *Triatoma gerstakeri*. (From 10 microscopic fields).

FIGURE 6.—Cultural forms of *Trypanosoma cruzi* (Texas strain) 5th generation *in vitro* (× 1,600) stained by Novy's modification of Romanowsky's stain. (From 10 microscopic fields.)

FIGURE 7.—Cultural forms of *Tr. cruzi* in process of division (Texas strain 5th generation *in vitro*) (× 1,600) stained by Novy's modification of Romanowsky's stain. (From 8 microscopic fields.)

FIGURE 8.—Section of the heart of an experimentally infected mouse. Leishmania forms of segmenting *Tr. cruzi* are within a muscle fiber (× 2,500).

FIGURE 9.—Sections of the hearts of mice, leishmania forms of segmenting *Tr. cruzi* are found within muscle fibers. *a, b, c,* and *d* are magnified 500 times, while *e* is magnified 1,000 times. (Note *d* and *e* are the same loaded muscle fiber with different magnification.)

FIGURE 10.—Section of the heart of a mouse containing numerous leishmania-like forms, *Tr. cruzi*, within muscle fibers. (*a*, × 500; *b*, × 1,600.)

resembling the letters "S" and "C." The parasite remains in a given microscopic field (objective 45X, ocular 10X) for over 10 minutes. The movements described above appear to be characteristic of *Tr. cruzi.* The flagellates are infective to susceptible test animals (table 1).

TABLE 1.—*Cultural and microscopic findings in animals inoculated with the intestinal contents of* Triatoma gerstakeri

Key No.	Species of animals inoculated with intestinal content of naturally infected *Triatoma gerstakeri*	Microscopic examination for trypanosomes in peripheral blood		Cultural attempts		Autopsy, number of days after inoculation
		Number of days after inoculation	Results	Number of days after inoculation	Results	
1431-1	Mus musculus	14, 21	++	21	+	[2] 21
1441-1a	do	14, 17, 145	0, 0, 0	145	+	[2] 145
1441-1b	do	14, 17, 145	0, 0, 0	145	+	145
1441-1c	do	14, 17, 145, 160	0, 0, 0, +	----------	----------	167
1448-1a	do	149, 156	0, 0	156	+	156
1448-1b	do	149, 156, 210	0, 0, +	210	+	210
1448-2b	do	3, 134	0, 0	134	0	134
1448-2c	do	3, 134, 149, 156	0, 0, 0, 0	156	+	156
1449-1a	do	37, 134	+, 0	134	0	[2] 134
1449-1b	do	37, 149, 156	+, 0, +	156	+	156
1449-2	do	37, 134	+, 0	134	+	[2] 134
1451-1a	do	24, 131	+, 0	131	+	131
1451-1b	do	24, 153	0, 0	153	+	153
1441-2a	Peromyscus eremicus	14	+	14	+	[2] 14
1441-2b	do	14, 145	+, 0	145	0	145
1441-2c	do	14, 48, 145, 167	+, 0, 0, 0	167	0	167
1439-2	Guinea pig	164	0	164	0	164
1440-1	do	161	0	161	0	161
1440-2	Rhesus monkey	16, 160	+, 0	16, 160	+, 0	160
1450-2	do	35, 138, 247, 372	+, 0, 0, 0	35, 138, 247, 372	++++	Alive
1519-1a	Mus musculus [1]	4, 8, 9, 15, 23	0, 0, 0, +, +	23	+	[2] 23
1519-1b	do [1]	9, 15, 39	0, +, +	39	+	[2] 39
1519-2a	Guinea pig [1]	9, 15, 21, 23	0, 0, 0, +	23	+	23
1519-2b	do [1]	15, 21, 39	0, 0, +	21, 39	+, +	39
1448-1c	Mus musculus	149, 169, 210	0, 0, +	210	----------	210
1448-2c	do	149, 248	0, 0	248	+	248
1452-1a	do. [3]	29, 153	0, 0	153	0	153
1531-1	do [3]	16, 20, 135	0, 0, 0	135	+	[2] 135
1537-1	do. [3]	115	0	115	+	115
1562-2a	do	54	0	54	+	[2] 54
1562-2b	do	54	0	54	+	[2] 54
1562-1a	Guinea pig	55	0	55	+	55

[1] Mice Nos. 1519–1a and 1519–1b and guinea pigs Nos. 1519–2a and 1519–2b were inoculated with culture of *Tr. cruzi* (fifth generation) isolated from mouse 1449–1a.

[2] Leishmania forms of *Tr. cruzi* were found in isolated muscle fibers in the sections of the heart of 10 animals.

[3] Mouse 1452–1a was inoculated with blood from mouse 1441–2; mouse 1519–1 and mouse 1537–1 were inoculated with blood from mouse 1529–2. The remaining 25 animals in this table were inoculated with intestinal contents of naturally infected *Triatoma gerstakeri.*

Trypanosoma cruzi in blood smears stain readily with Romanowsky's stain. The microorganisms as seen in stained preparations are curved and stumpy. Some individuals are broad, others narrow. The nucleus is usually central or slightly anterior to the center. The kinetoplast, which is large and ovoid, is located very close to the pointed posterior end. The undulating membrane is narrow and only slightly convoluted. The flagellum represents about one-third of the total length of the organism (fig. 5).

Cultural studies.—Out of the 35 cultural attempts, 27 gave rich growths of trypanosomes *in vitro.* Whenever trypanosomes were

demonstrable microscopically in the blood of inoculated animals at the time of bleeding, positive cultures were obtained. No trypanosomes were demonstrable in peripheral blood microscopically in 24 animals at the time of bleeding. However, positive cultures were obtained from 16 of these animals (table 1). The growth *in vitro* reached its maximum in about a month. In many cultures the colonies of trypanosomes were macroscopically noticeable in slant portions of blood agar slants. The viability of the flagellates on such a medium is remarkable. At times, even after the end of the fourth month, subcultures were obtained from original cultures taken. The subcultures were usually made monthly. They grew readily and luxuriantly, and were capable of infecting susceptible animals (table 1).

The cultural forms at times have an astonishing morphology. Certain forms are apparently more or less a constant feature of *Tr. cruzi.* The round bodies, irregular rosettes, narrow and broad, short and long crithidia and herpetomonas forms with long flagellum, and at times metacyclic trypanosome forms with complete but narrow undulating membranes are found side by side; dividing forms are met with frequently. As cultures grow older, the more rounded leishmania form; granulated and tadpole shaped trypanosomes are found in the free swimming stage, in rosettes, and in large aggregations. The cultural forms take stain readily (figs. 6 and 7).

Microscopic pathological findings.—Thirty-four infected animals were etherized at various stages of the disease (the minimum duration of infection was 21 days, the maximum, 210 days). The heart blood was removed for cultural and serologic studies, organs were fixed in 10 percent formalin and sent to the Division of Pathology for sectioning and staining. The slides were all examined by Dr. Ralph D. Lillie or Dr. L. L. Ashburn of the Division of Pathology, and by the writer. The usual interstitial myocarditis of American trypanosomiasis was found in practically every animal. Leishmania-like forms of segmenting trypanosomes, with a small, round, pale, basophilic nucleus and very deeply staining rod-shaped basophilic blepharoplast were found in cardiac muscles in only 10 mice (1 *Peromyscus eremicus*, 9 *Mus musculus*) (figs. 8, 9, and 10).

DISCUSSION

The field studies and experimental data at hand have shown that *Triatoma gerstakeri* in Texas is naturally infected with *Trypanosoma cruzi.* The flagellates, by virtue of their undulating membrane, are usually readily recognizable as being trypanosomes; furthermore, besides the crithidial forms there are found metacyclic forms of trypanosomes with narrow but complete undulating membranes. However, to prove that they are actually *Trypanosoma cruzi* requires animal inoculations, with subsequent microscopic demonstration of trypanosomes

in the blood of these test animals, and confirmation by cultural and serological tests (*11, 12, 13*). The final proof consists in the demonstration of leishmania forms of trypanosomes in sections of tissues, particularly in cardiac tissues (*1, 2, 3*).

Inasmuch as *Tr. cruzi* are not numerous in the blood of infected mice, guinea pigs, and monkeys, at times a microscopical search of 5 to 15 minutes or more must be made before a single trypanosome can be found. Therefore, a negative observation does not eliminate the possibility of infection.

The cultural tests are more satisfactory. They give positive results even though an hour of microscopic search has not demonstrated a single trypanosome in peripheral blood (table 1).

The agglutination test is valuable and of diagnostic significance (*13*).

The microscopic pathology, when positive for leishmania-like forms of trypanosomes in cardiac or other tissues, is also of diagnostic value (*2, 3, 5, 8*). However, negative findings do not exclude *Tr. cruzi* infection.

The bite, the act of sucking the blood, by *Triatoma* naturally or experimentally infected with *Tr. cruzi* is not infective to experimental animals; it is only when the fecal excretion of an infected bug comes in contact with the injured skin or mucous membrane that infection may result. Therefore, persons who have been merely bitten by these insects may be expected to be free from *Tr. cruzi* infection. However, persons who have crushed the bugs on their skin, or rubbed the excretions of the insect into their eyes should be looked upon as possible cases of Chagas' disease.

SUMMARY

Natural infection of *Triatoma gerstakeri* ("blood sucking insect," "kissing bug") with *Trypanosoma cruzi* has been demonstrated in insects collected in Texas.

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DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, FIRST QUARTER OF 1939[1]

By WILLIAM M. GAFAFER, *Senior Statistician, United States Public Health Service*

The material presented in this paper is based on reports from 26 industrial sick benefit organizations whose memberships include over 170,000 male workers. The different cooperating plants are located in Pennsylvania, Illinois, Massachusetts, Connecticut, New York, Ohio, Maine, South Dakota, New Jersey, and Canada. The data presented deal with the frequency of sickness and nonindustrial injuries causing disability lasting more than one week.

An examination of table 1 as a whole shows that with respect to all sickness and nonindustrial injuries the rate for the first quarter of 1939 (123.5) is 25 percent above the corresponding rate for 1938 (99.1) and 16 percent below that for 1937 (147.1). The increase during the first quarter of 1939 over this period in 1938 was apparently caused by the relatively high rate of respiratory diseases, principally influenza and grippe, which occurred at the rate of 40.0 cases per 1,000 workers. Of interest also is the decrease in the rate for hernia from 1.9 cases per 1,000 in 1938 to 1.2 in 1939, a decrease of over one-third.

[1] From the Division of Industrial Hygiene, National Institute of Health. For the reports for the third and fourth quarters of 1938 and the entire year, see PUBLIC HEALTH REPORTS for April 28, 1939 (54: 691-695).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause; the first quarter of 1939 compared with the first quarters of 1938 and 1937* [1]

Cause (Numbers in parentheses are disease title numbers from the International List of the Causes of Death, 1929)	Annual number of cases per 1,000 men		
	1939	1938	1937
Sickness and nonindustrial injuries [2]	123.5	99.1	147.1
Nonindustrial injuries (163–198)	9.5	10.8	10.1
Sickness	114.0	88.3	137.0
Respiratory diseases	65.4	39.1	87.5
Influenza and grippe (11)	40.0	16.8	60.9
Bronchitis, acute and chronic (106)	6.6	6.2	7.5
Diseases of the pharynx and tonsils (115a)	5.5	5.5	5.9
Pneumonia, all forms (107–109)	4.6	3.1	4.5
Tuberculosis of the respiratory system (23)	.7	.9	.8
Other respiratory diseases (104, 105, 110–114)	8.0	6.6	7.9
Nonrespiratory diseases	46.1	46.9	45.9
Digestive diseases	13.8	13.5	13.5
Diseases of the stomach, except cancer (117, 118)	3.4	3.9	3.9
Diarrhea and enteritis (120)	1.1	.7	.8
Appendicitis (121)	4.5	4.3	4.5
Hernia (122a)	1.2	1.9	1.5
Other digestive diseases (115b, 116, 122b–129)	3.6	2.7	2.8
Nondigestive diseases	32.3	33.4	32.4
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.0	4.8	5.0
Other genitourinary diseases (133–138)	2.5	2.7	2.1
Neuralgia, neuritis, sciatica (87a)	2.3	2.7	2.6
Neurasthenia and the like (part of 87b)	1.0	.9	.8
Other diseases of the nervous system (78–85, part of 87b)	1.0	1.5	.8
Rheumatism, acute and chronic (56, 57)	4.3	4.4	4.4
Diseases of the organs of locomotion, except diseases of the joints (156b)	3.0	2.8	2.7
Diseases of the skin (151–153)	2.7	3.0	3.1
Infectious and parasitic diseases (1–10, 12–22, 24–33, 36–44)	2.9	2.8	3.9
All other diseases (45–55, 58–77, 88, 89, 100, 101, 103, 154–156a, 157, 162)	7.7	7.8	7.0
Ill-defined and unknown causes (200)	2.5	2.3	3.6
Average number of males covered in the record	170,541	172,257	176,209
Number of organizations	26	26	26

[1] The same organizations are included in 1939, 1938, and 1937.
[2] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.

FIRST QUARTERS OF THE YEARS 1930–39

Since interest at this time centers round the respiratory diseases and hernia, it is desirable to examine the position of the rates for these diagnoses in relation to the corresponding rates for the first quarters of previous years. For this purpose a 10-year period has been selected. The pertinent frequencies are given in table 2, and shown graphically in figure 1.

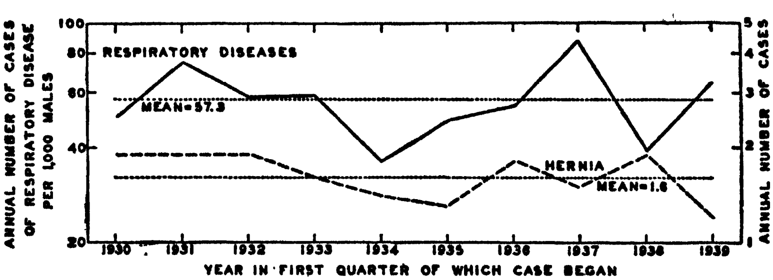

FIGURE 1.—Frequency (logarithmic) of disability lasting 8 consecutive calendar days or longer caused by respiratory diseases and hernia for the first quarters of 1930–39, inclusive. (Male morbidity experience of industrial companies which reported their cases to the United States Public Health Service.)

TABLE 2.—*Frequency of disabling cases of respiratory diseases and hernia lasting 8 consecutive calendar days or longer among* MALE *employees in various industries; the first quarters of 1930 to 1939, inclusive* [1]

Cause	Annual number of cases per 1,000 men for the first quarters of the years—									
	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Respiratory diseases	50.4	75.2	58.3	58.7	36.2	48.6	53.8	87.5	39.1	65.4
Hernia	1.9	1.9	1.9	1.6	1.4	1.3	1.8	1.5	1.9	1.2

[1] The data are taken from the earlier papers of the present series, and from table 1. See PUBLIC HEALTH REPORTS for July 7, 1933, June 29, 1934; August 23, 1935; July 24, 1936; and August 27, 1937.

Respiratory diseases.—The frequency rates for the respiratory diseases for the first quarter of the 10 years 1930–39 fluctuate about a mean of 57.3, with a lower limit of 36.2 in 1934 and an upper limit of 87.5 in 1937. The rate for 1939 (65.4) is exceeded only by those for 1937 (87.5) and 1931 (75.2). It is of interest to observe that 3 years were required for the peak of 1931 to reach the minimum of 1934 while, similarly, 3 years were required for the minimum of 1934 to reach the peak of 1937. Following 1937 there was a precipitous drop to the level of 1938 (39.1), which approximated the minimum of 1934. Thereafter there was a rapid rise to the level of 1939.

Hernia.—In this connection it should be stated that the cause of disability is given by the reporting organizations in the majority of instances merely as "hernia." The days of disability may have been accounted for by the repair of the hernia by mechanical or operative means. The rates for hernia for the first quarter of the 10 years 1930–39 give a mean of 1.6, the lowest rate of the series being 1.2 for 1939 and the highest 1.9, for each of the 3 years 1930–32 and for 1938. The rate moved slowly from 1.9 down to 1.3, the rate for 1935, then rapidly up to the level of 1936 (1.8), and finally down to 1.2, the rate for 1939.

OUTBREAK OF BOTULISM IN TENNESSEE DUE TO TYPE B *Cl. Botulinum* [1]

By C. B. TUCKER, M. D., and HOMER SWANSON, M. D.

Reports from Southern States of outbreaks of botulism have been few in number. The outbreak here reported is of particular interest because, for the first time, *Clostridium botulinum* toxin was demonstrated to be present in home-canned vegetables in Tennessee. Moreover, for the first time in Tennessee *Clostridium botulinum*, type B, was actually recovered. Although outbreaks of botulism from type B *Cl. botulinum* toxin are quite common in Europe, reports of such outbreaks in the United States are rare.

[1] From the Tennessee Department of Public Health and the Department of Medicine, Vanderbilt University School of Medicine, Nashville, Tenn.

CASE REPORTS

Case 1.—Mrs. G. W., white female, aged 52 years, was admitted to the Vanderbilt University Hospital on February 17, 1939, three days after the onset of an illness characterized by diplopia, weakness, dysphagia, and hoarseness. For two days prior to admission she had been unable to swallow liquids. At the time of admission she could not talk above a whisper.

Physical examination revealed a stuporous, acutely ill, white female, who exhibited difficulty in controlling the movements of the neck. Speech was labored and bilateral ptosis was present. Attempts at swallowing resulted in regurgitation of the fluid through the nose. Respirations were shallow and labored. The pupils were equal but failed to react to light. All movements of the extraocular muscles were impaired. No facial paralysis was present. The tongue and mucous membranes of the mouth and pharynx were dry and hyperemic. The vocal cords were in a semiadducted position and showed very little movement. There was no enlargement of the heart nor were murmurs present. The chest was clear on percussion and auscultation. Examination of the abdomen and extremities revealed no abnormalities. There were no changes in the deep reflexes.

Examination of the urine showed no significant abnormalities. Examination of the blood revealed an erythrocyte count of 4,600,000 cells per cm.; hemoglobin 14.2 grams per 100 cc.; white blood count 5,100 per cm., with 46 percent polymorphonuclear neutrophils, 1 percent polymorphonuclear eosinophils, 46 percent lymphocytes, 4 percent large mononuclears, and 3 percent of unclassified cells. A stained blood film revealed no abnormalities. Twenty-four hours after admission the leucocyte count rose to 9,000 and 48 hours after admission to 11,000. The Kahn test on the blood was negative.

The temperature on the day of admission varied from 99° to 99.4° F. and remained within this range for the next 12 hours, but subsequently rose to a maximum of 102° F. before death.

Fluids were supplied by clysis. Prostigmin and thiamin were administered. The patient was placed in a Drinker respirator, but in spite of these and other measures her condition grew progressively worse. She developed bronchopneumonia and died 48 hours after admission to the hospital. Permission to perform an autopsy was not obtained.

Case 2.[2]—Mr. G. W., white male, age 54 years, became ill on February 14, 1939, within an hour of the time his wife (case 1) was stricken. The onset of his illness was characterized by weakness, which was followed soon by dysphagia and slight diplopia. These symptoms con-

[2] This patient was not observed during his illness by the authors.

tinued for approximately 2 weeks, gradually decreasing in severity. He recovered completely.

Mr. and Mrs. G. W. lived alone in Westmoreland, Sumner County, Tenn. In the summer of 1938, Mrs. G. W. canned several quarts of beans and two quarts of okra. The beans were grown a few miles from her house, the okra in her home garden. In preparing these vegetables for canning, Mrs. G. W. boiled the beans for 2½ hours. They were then put into jars and heated for an additional 30 minutes. Then the jars were sealed. The okra was boiled for 30 minutes and was then placed in jars and sealed without further heating.

Jars of beans were opened and the contents eaten from time to time without ill effects. In January 1939, a daughter came to visit Mrs. G. W. and one of the jars of okra was opened. The daughter noted an offensive odor and the okra was discarded. Mrs. G. W. was not impressed by the odor. Her sense of smell was poor, presumably as a result of protracted chronic sinusitis.

On February 13, 1939, Mrs. G. W. opened the second can of okra and a jar of beans. The beans and okra were mixed, warmed, and served. Her husband noted that the mixture had a disagreeable odor, as though it had been scorched. However, both ate bountifully of the bean and okra mixture. Within 30 minutes, Mr. G. W. became nauseated and vomited profusely. Following the attack he took several drams of paregoric. His wife remained free from symptoms of any kind until the next day. No alcoholic beverages had been taken by either of them for more than a week preceding this meal. Mr. and Mrs. G. W. became ill with symptoms characteristic of botulism approximately 24 hours after eating the bean and okra mixture.

The jar which had contained the okra was found and specimens of okra and fluid were recovered from it. The jar which contained the beans had been discarded; however, another jar of the same lot was obtained for examination.

The specimens of the beans and okra were examined by the Division of Laboratories of the Tennessee Department of Public Health. A growth of *Cl. botulinum* was obtained from the okra. By means of protection tests with specific antitoxins, the organism was identified as *Cl. botulinum*, type B. No growth was obtained from the specimen of beans, and animal inoculations were not carried out with extracts of the beans.

Portions of the beans and okra were sent for bacteriological examination to the National Institute of Health of the United States Public Health Service. Examination there revealed that type B *Cl. botulinum* toxin was present in both specimens. Apparently the toxin in the beans was less concentrated than that in the okra, since symptoms in animals inoculated with the former developed much more slowly than was the case following inoculation with the latter.

A specimen of blood obtained from Mr. G. W. was sent to the National Institute of Health for botulinus antitoxin titration. No antitoxin was demonstrated.

DISCUSSION

Prior to 1928 botulism was not on the list of reportable diseases in Tennessee. In that year regulations governing communicable diseases were revised and botulism was made reportable. From 1928 through 1938, 13 cases of the disease were recorded, 9 cases being reported in 1932, 3 cases in 1933, and 1 in 1937.

No information is available regarding 2 of the cases reported in 1932. The other cases reported in that year occurred in Blount County (*1*). They resulted from the ingestion of a vegetable soup prepared from home-canned vegetables. Apparently no attempt was made to confirm the diagnosis by laboratory procedures. Three cases, with 2 deaths and 1 recovery, were reported from Unicoi County (*2*) in 1933. This outbreak resulted from eating home-dried beans. The variety of bean is not stated in the record and no determination was made of the type of toxin involved.

A mild case of botulism, in which recovery ensued, was observed in the Vanderbilt University Hospital in 1937. The patient was from Overton County. The contaminated material was not determined.

The first recognized outbreak of botulism in Tennessee occurred in Memphis in February 1920,[3] and was not reported to the Tennessee Department of Public Health. Seven cases with 7 deaths resulted from eating commercially canned ripe olives. This outbreak was one of 6 (*3*) which occurred in the United States. All were attributed to ripe olives which had been canned in California. *Cl. botulinum*, type A, was recovered from a specimen of the olives (*3*, *4*) which caused the Memphis outbreak.

SUMMARY

1. Twenty cases of botulism in Tennessee which occurred prior to 1939 are reviewed.
2. Two cases of botulism due to the toxin of *Cl. botulinum*, type B, are reported. Home-canned okra and possibly home-canned beans were the foods responsible for the outbreak.
3. This is the first recorded instance of the demonstration in Tennessee of *Cl. botulinum* toxin in home-canned vegetables.
4. *Cl. botulinum*, type B, is reported for the first time as a cause of botulism in Tennessee.

[3] Personal communication from Dr. L. M. Graves, Superintendent of Health, Memphis, Tennessee.

ACKNOWLEDGMENTS

The authors are indebted to the National Institute of Health for cooperation and assistance in making the bacteriological diagnosis and serological titrations, and for supplying botulinus antitoxin for typing purposes.

They also wish to express appreciation for the contributions which were made by Doctor A. E. Keller of the Department of Preventive Medicine and Public Health of Vanderbilt University School of Medicine and by Mr. W. H. Gaub, director of laboratories of the Tennessee Department of Public Health.

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COURT DECISION ON PUBLIC HEALTH

Power of town board of health as to employment of agent.—(Massachusetts Supreme Judicial Court; *Breault* v. *Town of Auburn*, 22 N. E. 2d 46; decided June 30, 1939.) On January 2, 1935, the plaintiff entered into a written contract with the board of health of the defendant town to act as the board's full time agent for the year 1935. On February 26, 1935, the board of health voted to dispense with the plaintiff's services from a date 2 weeks thereafter. The services of plaintiff were dispensed with in strict accordance with the terms of the contract, among which was a provision that "The employment shall terminate only after due notice of either party given in writing * * *." Thereafter at a town meeting it was voted to ratify the contract, to rescind its provisions relative to termination of the employment, and to instruct and direct the board of health to employ the plaintiff as full-time agent for the balance of the year. The board of health refused to recognize this action of the town meeting. In an action brought by the plaintiff against the town the supreme court cited a statute under which the board of health was empowered to "employ the necessary officers, agents, and assistants to execute the health laws and its regulations" and to "fix the salary or other compensation of such * * * agents and assistants", and stated that "The attempts of the defendant to ratify the contract entered into between the plaintiff and the board of health and to direct the employ-

ment of the plaintiff by the board were ineffective." Continuing, the court said:

In their conduct with relation to the contract of employment of the plaintiff and in dispensing with his services under and in accordance with its terms, the members of the board were exercising powers conferred upon them by the legislature and were acting as public officers and not as agents of the town. [Cases cited.] While the word "may" is used in said section 27, we think that the power therein conferred, although leaving much to the board's discretion, is one which is vested exclusively in the board and is to be exercised without reference to the approval or disapproval of the defendant. [Cases cited.] In the exercise of the statutory authority conferred on the members of the board by section 27, no relation of agency existed between them and the defendant. "A municipality can exercise no direction or control over one whose duties have been defined by the legislature." * * *

It follows that the defendant could not legally instruct the members of the board as it sought to do by the vote of March 19, 1935, and could exercise no direction or control over them as to the selection of an agent whom, by the provisions of section 27, they were authorized to choose for themselves. * * *

DEATHS DURING WEEK ENDED AUGUST 5, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 5, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,114	7,266
Average for 3 prior years	[1] 7,178	
Total deaths, first 31 weeks of year	265,779	258,521
Deaths under 1 year of age	412	541
Average for 3 prior years	[1] 506	
Deaths under 1 year of age, first 31 weeks of year	15,796	16,489
Data from industrial insurance companies:		
Policies in force	66,862,304	68,976,881
Number of death claims	10,339	11,017
Death claims per 1,000 policies in force, annual rate	8.1	8.3
Death claims per 1,000 policies, first 31 weeks of year, annual rate	10.6	9.5

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 12, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	......	......	11	......	30	5	1	4
New Hampshire	0	0	0	0	......	......	......	......	30	3	......	1
Vermont	0	0	0	0	......	......	......	......	134	10	2	2
Massachusetts	4	3	3	7	......	......	......	......	59	50	88	82
Rhode Island	0	0	0	0	......	......	......	......	183	24	1	1
Connecticut	3	1	0	2	......	......	......	......	56	19	6	16
MID. ATL.												
New York	4	11	9	12	[1] 3	[1] 4	([1])	[1] 4	52	130	202	202
New Jersey	5	4	1	6	1	1	3	3	17	14	33	41
Pennsylvania	9	17	16	16	......	......	......	......	21	42	150	150
E. NO. CEN.												
Ohio	2	3	36	12	5	7	......	4	12	16	58	65
Indiana	7	5	5	8	3	2	9	9	1	1	12	12
Illinois	15	23	13	14	3	4	2	4	10	15	30	66
Michigan [3]	6	6	12	12	......	......	......	......	41	39	123	60
Wisconsin	4	2	1	2	......	......	14	14	79	45	134	134
W. NO. CEN.												
Minnesota	2	1	2	2	......	......	3	1	21	11	30	5
Iowa	8	4	2	3	2	1	2	2	43	21	21	5
Missouri	0	0	5	15	......	......	14	25	0	0	4	13
North Dakota	22	3	0	2	......	......	......	......	15	2	22	11
South Dakota	8	1	2	1	8	1	......	......	23	3	......	2
Nebraska	0	0	1	4	......	......	......	......	0	0	......	3
Kansas	8	8	8	5	......	......	6	1	8	2	7	6

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 12, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median
SO. ATL.												
Delaware	0	0	0	0	-----	------	-----	------	0	0	------	2
Maryland [3]	3	1	3	3	-----	------	6	2	19	6	6	8
Dist. of Col [3]	16	2	3	3	-----	------	------	------	65	8	3	3
Virginia	47	25	22	10	56	30	-----	------	36	19	33	81
West Virginia	13	5	5	5	11	4	7	12	8	3	1	4
North Carolina [3]	39	27	25	18	-----	------	-----	------	19	13	82	27
South Carolina [3]	30	11	12	4	331	121	71	51	3	1	15	8
Georgia [3]	33	20	27	8	-----	------	-----	------	10	6	------	0
Florida [3]	6	2	4	6	15	5	1	1	6	2	------	2
E. SO. CEN.												
Kentucky	24	14	11	10	3	2	1	------	0	0	4	14
Tennessee	12	7	18	8	16	9	6	7	11	6	19	15
Alabama [3]	30	17	12	12	37	21	12	3	7	4	3	4
Mississippi [2, 3]	33	13	7	12	-----	------	------	------	0	0	------	0
W. SO. CEN.												
Arkansas	17	7	9	8	27	11	18	4	0	0	4	3
Louisiana [3]	5	2	11	11	17	7	20	6	10	4	13	4
Oklahoma	8	4	2	4	20	10	17	11	4	2	4	4
Texas [3]	13	16	39	33	19	23	96	39	6	7	21	39
MOUNTAIN												
Montana	0	0	0	1	-----	------	------	------	159	17	23	8
Idaho	0	0	0	0	-----	------	4	------	10	1	6	4
Wyoming	22	1	0	0	-----	------	------	------	196	9	1	4
Colorado [4]	63	13	14	3	19	4	------	------	39	8	10	10
New Mexico	0	0	3	1	-----	------	------	1	0	0	5	5
Arizona	12	1	3	1	86	7	22	7	49	4	11	3
Utah [2]	0	0	0	0	-----	------	5	------	60	6	22	4
PACIFIC												
Washington	9	3	0	0	-----	------	1	------	299	97	12	12
Oregon	0	0	1	1	5	1	6	4	94	19	11	7
California	16	19	10	17	3	4	5	5	93	113	138	67
Total	12	297	352	351	13	279	362	268	33	808	1,371	1,336
32 weeks	15	11,789	14,089	14,796	223	151,290	15,734	103,767	439	347,819	759,611	667,139

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	------	1	0	0	0	0	1	12	2	2	4
New Hampshire	0	0	0	0	0	0	0	0	10	1	0	1
Vermont	0	0	0	0	13	1	0	0	13	1	0	0
Massachusetts	2.4	2	0	0	5	4	0	6	24	20	23	85
Rhode Island	0	0	0	0	8	1	0	0	0	0	3	3
Connecticut	0	0	1	1	9	3	1	1	9	3	3	6
MID. ATL.												
New York	1.2	3	3	3	4	11	9	9	28	71	58	100
New Jersey	0	0	0	1	4	3	4	6	17	14	13	14
Pennsylvania	2	4	1	5	4	7	1	8	25	50	42	74

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 12, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934-38, median
E. NO. CEN.												
Ohio	0.8	1	2	2	7	9	1	4	47	61	82	77
Indiana	0	0	2	2	1.5	1	0	1	36	24	22	22
Illinois	0	0	1	3	3	5	8	11	34	52	64	90
Michigan [2]	1.1	1	0	0	82	78	2	4	76	72	78	76
Wisconsin	0	0	1	0	5	3	2	2	53	30	31	31
W. NO. CEN.												
Minnesota	0	0	0	0	45	23	4	1	43	22	13	19
Iowa	2	1	2	2	2	1	2	1	6	3	9	10
Missouri	0	0	0	0	1.3	1	0	1	17	13	16	15
North Dakota	7	1	0	0	7	1	2	0	80	11	5	4
South Dakota	0	0	0	0	0	0	2	0	98	13	5	5
Nebraska	0	0	0	0	8	2	0	0	46	12	2	3
Kansas	0	0	0	0	17	6	0	2	67	24	35	21
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	0	0	1	1
Maryland [3]	3	1	1	2	0	0	1	2	49	16	8	10
Dist. of Col.[3]	0	0	1	0	0	0	2	1	40	5	2	2
Virginia	0	0	1	1	4	2	2	4	15	8	13	13
West Virginia	0	0	1	1	0	0	1	2	32	12	14	14
North Carolina [3]	1.5	1	4	1	10	7	2	4	47	32	25	21
South Carolina [3]	2.7	1	0	0	38	14	2	2	25	9	1	2
Georgia [3]	1.7	1	0	0	5	3	0	0	13	8	6	5
Florida [3]	0	0	0	0	6	2	2	2	6	2	1	2
E. SO. CEN.												
Kentucky	1.7	1	2	2	10	6	2	2	35	20	17	15
Tennessee	4	2	2	1	0	0	0	1	25	14	15	8
Alabama [3]	5	3	0	1	4	2	2	3	26	15	13	8
Mississippi [2] [3]	2.5	1	1	0	5	2	0	0	8	3	3	5
W. SO. CEN.												
Arkansas	0	0	2	1	0	0	0	0	20	8	11	5
Louisiana [3]	0	0	2	0	0	0	1	1	12	5	3	4
Oklahoma	0	0	0	0	4	2	1	1	8	4	8	8
Texas [3]	2.5	8	3	1	.8	1	0	1	10	12	53	84
MOUNTAIN												
Montana	0	0	0	0	0	0	1	1	28	3	7	6
Idaho	10	1	1	0	0	0	0	0	0	0	1	3
Wyoming	0	0	0	0	0	0	0	0	0	0	2	2
Colorado [4]	0	0	0	1	14	3	1	1	96	20	12	12
New Mexico	0	0	0	0	25	2	0	0	62	5	5	3
Arizona	12	1	0	0	49	4	0	0	25	2	1	1
Utah	0	0	0	0	0	0	0	0	20	2	8	7
PACIFIC												
Washington	0	0	1	0	0	0	0	1	28	9	8	15
Oregon	5	1	0	0	0	0	0	1	35	7	8	8
California	1.6	2	6	3	42	51	5	20	82	39	46	53
Total	1.3	32	42	60	10	261	63	299	30	759	798	878
32 weeks	1.7	1,353	2,114	4,087	2.2	1,805	857	2,801	144	115,792	136,453	164,040

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 12, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934–38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases	1934–38, median	Aug. 12, 1939, rate	Aug. 12, 1939, cases	Aug. 13, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	3	1	91	15	32
New Hampshire	0	0	0	0	0	0	1	1	0	0	------
Vermont	0	0	0	0	13	1	2	0	161	12	33
Massachusetts	0	0	0	0	1	1	0	4	91	77	91
Rhode Island	0	0	0	0	15	2	0	0	92	12	30
Connecticut	0	0	0	0	9	3	1	1	169	57	74
MID. ATL.											
New York	0	0	0	0	4	10	26	26	157	391	669
New Jersey	0	0	0	0	7	6	2	6	214	180	268
Pennsylvania	0	0	0	0	13	25	14	22	197	388	254
E. NO. CEN.											
Ohio	1	1	0	0	12	16	28	28	198	257	391
Indiana	0	0	4	1	12	8	6	7	74	50	10
Illinois	1	2	5	1	23	35	37	37	195	298	483
Michigan [2]	2	2	4	0	21	20	12	12	262	248	488
Wisconsin	0	0	0	3	2	1	2	2	334	190	460
W. NO. CEN.											
Minnesota	0	0	3	1	4	2	0	1	56	29	70
Iowa	4	2	4	4	2	1	12	6	20	10	27
Missouri	0	0	4	1	18	14	16	30	41	32	18
North Dakota	0	0	4	0	0	0	0	1	73	10	48
South Dakota	8	1	2	1	15	2	0	0	23	3	8
Nebraska	4	1	3	0	8	2	1	0	50	13	16
Kansas	3	1	0	0	11	4	8	10	39	14	46
SO. ATL.											
Delaware	0	0	0	0	89	2	2	1	138	7	8
Maryland [2]	0	0	0	0	37	12	14	15	176	57	36
Dist. of Col. [3]	0	0	0	0	16	2	3	2	364	45	11
Virginia	0	0	0	0	43	23	17	35	186	99	67
West Virginia	0	0	0	0	59	22	22	26	22	8	35
North Carolina [3]	0	0	0	0	19	13	12	30	130	89	250
South Carolina [3]	0	0	0	0	41	15	27	20	96	35	70
Georgia [3]	0	0	0	0	60	36	26	26	13	8	34
Florida [3]	0	0	0	0	15	5	2	1	9	3	12
E. SO. CEN.											
Kentucky	0	0	0	0	75	43	54	50	75	43	108
Tennessee	2	1	1	0	62	35	28	40	26	15	44
Alabama [3]	0	0	0	0	21	12	18	26	37	21	22
Mississippi [2] [3]	0	0	0	0	18	7	6	13	------	------	------
W. SO. CEN.											
Arkansas	0	0	0	0	50	20	21	24	35	14	5
Louisiana [3]	0	0	0	0	53	22	19	19	104	43	47
Oklahoma	0	0	1	0	30	15	21	44	2	1	5
Texas [3]	0	0	0	1	41	49	105	87	48	58	256
MOUNTAIN											
Montana	0	0	0	0	9	1	1	3	91	10	60
Idaho	0	0	0	0	20	2	1	1	31	3	2
Wyoming	22	1	0	0	22	1	2	0	0	0	2
Colorado [4]	0	0	4	0	10	2	5	2	106	22	45
New Mexico	12	1	0	0	25	2	6	7	111	9	8
Arizona	0	0	0	0	12	1	3	3	74	6	22
Utah [2]	0	0	0	1	10	1	0	1	834	84	37
PACIFIC											
Washington	0	0	7	2	0	0	8	3	40	13	50
Oregon	0	0	11	1	15	3	3	3	129	26	20
California	7	9	3	3	3	4	8	15	75	91	167
Total	1	22	60	33	20	506	608	730	125	3,096	4,934
32 weeks	11	8,632	12,663	6,026	8	6,602	7,588	7,588	157	123,958	139,834

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Aug. 12, 1939, 102 cases as follows: District of Columbia, 1; North Carolina, 4; South Carolina, 9; Georgia, 45; Florida, 3; Alabama, 13; Mississippi, 3; Louisiana, 1; Texas, 23.
[4] Psittacosis, week ended Aug. 12, 1939, Colorado, 1 case.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Aug. 19, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Week ended Aug. 19
Eastern:							
New York				3	3	1	
New Jersey				4	8	7	6
Pennsylvania				6	3	4	
Delaware				3			1
Maryland			7	13	11	23	2
District of Columbia			2	2	2	3	1
Virginia			1	13	10	11	2
West Virginia						1	
North Carolina				3	13	13	3
Georgia					1	1	
Central:							
Ohio				3	2	4	
Indiana				2	1	3	2
Illinois			1	1	5	7	1
Kentucky							3
Tennessee					5	5	4
Iowa			1	10	9	6	1
Missouri				1		4	
Western:							
Montana	[1] 2	2	8	5	1	2	
Idaho		4	7	4	5		
Wyoming		3	14	16	5	5	
Colorado		2	3	9	4		
Utah		2	5	5	6	2	
Washington		2	3	2			
Oregon		9	16	7	2	1	

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
June 1939										
Alaska	1	12		79	0		0	4	1	1
July 1939										
California	88	44	56	1,591	4	7	157	250	45	39
Idaho	1			12	0		0	4	5	3
Florida	15	23	76	60	3	23	11	16	0	15
Wyoming	2	1		61	0		1	11	4	2

Summary of monthly reports from States—Continued

July 1939	Cases
Anthrax:	
California	1
Chickenpox:	
California	542
Idaho	7
Florida	18
Wyoming	2
Colorado tick fever:	
Wyoming	4
Dysentery:	
California (amoebic)	17
California (bacillary)	59
Florida (amoebic)	2
Florida (bacillary)	1
Encephalitis, epidemic or lethargic:	
California	10
Florida	2
Food poisoning:	
California	205
German measles:	
California	41
Idaho	1
Granuloma, coccidioidal:	
California	8
Hookworm:	
Florida	369
Jaundice, epidemic:	
California	2
Idaho	1

July 1939—Continued	Cases
Leprosy:	
California	2
Lead poisoning:	
Idaho	1
Mumps:	
California	703
Idaho	2
Florida	61
Wyoming	47
Ophthalmia neonatorum:	
California	1
Psittacosis:	
California	1
Rabies in animals:	
California	27
Idaho	1
Florida	4
Relapsing fever:	
California	5
Rocky Mountain spotted fever:	
Idaho	2
Wyoming	4
Septic sore throat:	
California	4
Idaho	3
Florida	6
Wyoming	2

July 1939—Continued	Cases
Tetanus:	
California	8
Florida	1
Trachoma:	
California	41
Trichinosis:	
California	3
Idaho	1
Tularaemia:	
California	3
Wyoming	2
Typhus fever:	
California	1
Florida	21
Undulant fever:	
California	31
Idaho	8
Florida	10
Wyoming	3
Vincent's infection:	
Idaho	1
Florida	12
Wyoming	1
Whooping cough:	
California	470
Idaho	15
Florida	90
Wyoming	6

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN BEAVERHEAD COUNTY, MONT.

Under date of August 7, 1939, Surgeon L. B. Byington reported plague infection proved in a lot of 70 fleas from 64 ground squirrels, *C. columbianus*, shot July 17, 15 miles north of Wisdom, Beaverhead County, Mont.

CASES OF VENEREAL DISEASES REPORTED FOR JUNE 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,620	5.60	264	0.91
Arizona	174	4.22	153	3.71
Arkansas	912	4.45	247	1.21
California	1,774	2.88	1,139	1.85
Colorado	113	1.06	73	.68
Connecticut	225	1.29	88	.51
Delaware	165	6.32	49	1.88
District of Columbia	422	6.73	260	4.15
Florida	1,025	6.14	97	.58
Georgia	1,559	5.05	64	.21
Idaho	14	.28	20	.41
Illinois	2,624	3.33	1,362	1.73
Indiana	604	1.74	83	.24
Iowa	242	.95	163	.64
Kansas	302	1.62	108	.58
Kentucky	749	2.57	299	1.02
Louisiana	601	2.82	88	.41
Maine	41	.48	40	.47
Maryland	923	5.50	281	1.67
Massachusetts	417	.94	415	.94
Michigan	1,417	2.93	601	1.24

See footnotes at end of table.

Cases of venereal diseases reported for June 1939—Continued

Reports from States—Continued

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Minnesota	245	0 92	189	0 71
Mississippi	2,363	11 68	2,643	13 06
Missouri	1,415	3 55	234	59
Montana	52	.96	25	.46
Nebraska	56	.41	60	.44
Nevada	34	3 37	16	1 58
New Hampshire	15	29	5	.10
New Jersey	848	1.95	234	54
New Mexico	113	2 68	28	.66
New York	5,183	4 00	2,226	1 72
North Carolina	1,874	5 37	322	.92
North Dakota	36	51	30	.42
Ohio	1,019	1 51	315	47
Oklahoma	796	3 12	243	.95
Oregon	159	1 55	140	1 36
Pennsylvania	1,196	1 18	158	.16
Rhode Island	132	1 94	52	76
South Carolina	1,115	5 95	302	1 61
South Dakota	16	23	18	26
Tennessee	1,062	3 67	408	1 41
Texas	4,267	6 91	945	1 53
Utah	13	.25	9	17
Vermont	12	31	7	18
Virginia	1,692	6 25	283	1 05
Washington	227	1 37	240	1 45
West Virginia	6,302	33 79	619	3.32
Wisconsin	80	27	90	31
Wyoming	11	17	4	.17
Total	46,256	3 58	15,739	1 22

Reports from cities with populations of 200,000 or over

Atlanta, Ga	385	12.82	73	2 43
Baltimore, Md	632	7 57	198	2.37
Birmingham, Ala	305	1 04	32	11
Boston, Mass	164	2 06	169	2 12
Buffalo, N Y	140	2 33	47	78
Chicago, Ill	1,754	4 79	913	2 49
Cincinnati, Ohio	156	3 30	67	1 42
Cleveland, Ohio	286	3 03	114	1 21
Columbus, Ohio	115	3 67	11	35
Dallas, Tex	284	9 34	129	4 24
Denver, Colo	68	2 26	50	1 66
Detroit, Mich	861	4 74	318	1 75
Houston, Tex	333	9 29	156	4 35
Indianapolis, Ind	36	93	43	1 12
Kansas City, Mo	115	2 66	32	.74
Louisville, Ky	235	6 93	60	1.77
Memphis, Tenn	298	10 20	100	3 42
Minneapolis, Minn	60	1 20	52	1 04
Newark, N J	331	7 29	121	2 66
New York, N. Y	3,907	5 22	1,760	2.35
Oakland, Calif	36	1 15	26	.83
Omaha, Nebr	31	1 39	21	.94
Philadelphia, Pa	394	1.96	------	------
Pittsburgh, Pa	350	4 97	31	.44
Portland, Oreg	84	2 62	43	1.34
Rochester, N. Y	31	.91	33	.96
St Louis, Mo	922	10.94	127	1.51
St. Paul, Minn	33	1 15	19	.66
San Francisco, Calif	217	3.15	185	2.68
Seattle, Wash	104	2.69	137	3.54
Syracuse, N. Y	113	5 01	12	.53
Washington, D. C	422	6 73	260	4.15

No reports received from Akron, Dayton, Jersey City, Los Angeles, Milwaukee, New Orleans, Providence, San Antonio, and Toledo.

WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 5, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	91	31	11	517	292	280	4	356	78	1,411	--------
Current week [1]	58	20	7	264	212	208	0	294	42	1,377	--------
Maine:											
Portland	0	------	0	0	2	1	0	0	0	6	21
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	1	0	7
Manchester	0	------	0	0	0	1	0	0	0	0	8
Nashua	0	------	0	0	0	0	0	0	0	0	3
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	1	5
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	1	------	0	24	4	9	0	5	0	26	160
Fall River	0	------	0	0	1	0	0	3	0	3	31
Springfield	0	------	0	0	1	0	0	1	0	2	33
Worcester	0	------	0	3	4	0	0	2	0	19	32
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	16
Providence	0	------	0	18	1	2	0	3	0	11	65
Connecticut:											
Bridgeport	0	------	0	1	1	0	0	0	0	0	28
Hartford	0	------	0	0	1	0	0	1	0	11	34
New Haven	0	------	0	7	0	0	0	2	0	12	43
New York:											
Buffalo	1	------	0	5	9	3	0	3	0	13	134
New York	15	2	1	34	32	14	0	74	6	161	1,251
Rochester	1	------	0	3	1	1	0	1	0	5	52
Syracuse	0	------	0	8	1	2	0	0	0	77	36
New Jersey:											
Camden	0	------	0	0	1	2	0	0	2	1	23
Newark	0	------	0	0	1	1	0	2	0	47	68
Trenton	0	1	1	1	2	0	0	2	0	3	24
Pennsylvania:											
Philadelphia	3	1	0	13	8	8	0	19	3	129	306
Pittsburgh	0	1	0	0	11	2	0	4	3	8	129
Reading	0	------	0	0	0	1	0	3	0	0	17
Scranton	1	------	------	0	------	0	0	------	0	2	------
Ohio:											
Cincinnati	0	------	0	0	4	2	0	2	0	16	107
Cleveland	0	4	0	4	5	12	0	3	0	48	162
Columbus	------	------	------	------	------	------	------	------	------	------	------
Toledo	0	------	0	2	0	5	0	5	0	48	71
Indiana:											
Anderson	0	------	0	0	1	0	0	1	0	1	15
Fort Wayne	0	------	0	0	2	0	0	1	0	0	25
Indianapolis	3	------	0	0	3	6	0	4	2	63	99
Muncie	0	------	0	0	1	0	0	0	0	0	10
South Bend	0	------	0	0	0	2	0	0	0	4	14
Terre Haute	0	------	0	1	2	1	0	1	0	0	31
Illinois:											
Alton	0	------	0	0	1	0	0	0	0	0	5
Chicago	7	------	0	4	12	22	0	39	3	137	588
Elgin	0	------	0	0	0	0	0	0	0	8	14
Moline	0	------	0	0	0	1	0	0	0	2	4
Springfield	0	------	1	0	0	0	0	0	0	13	21
Michigan:											
Detroit	3	------	0	6	7	27	0	14	1	91	212
Flint	0	------	0	1	1	2	0	0	0	1	20
Grand Rapids	0	------	0	1	0	5	0	0	0	5	28
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	2	7
Madison	0	------	0	1	0	0	0	0	0	23	10
Milwaukee	0	1	1	1	1	8	0	3	0	28	75
Racine	0	------	0	2	0	0	0	0	0	8	7
Superior	0	------	0	0	0	1	0	0	0	0	6

[1] Figures for Barre and Columbus estimated; reports not received.

City reports for week ended Aug. 5, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	2	0	5	0	0	0	1	10
Minneapolis	0	------	0	1	1	8	0	1	0	5	89
St. Paul	0	------	0	2	0	4	0	0	0	29	60
Iowa:											
Cedar Rapids	0	------	------	1	------	0	0	------	0	0	------
Des Moines	1	------	0	1	0	0	1	0	0	0	16
Sioux City	0	------	------	0	------	0	0	------	0	0	------
Waterloo	2	------	------	0	------	0	0	------	0	2	------
Missouri:											
Kansas City	0	------	0	1	7	1	0	1	1	0	67
St. Joseph	0	------	0	0	1	0	0	0	0	0	27
St. Louis	0	------	0	0	6	3	0	6	0	22	171
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	0	2
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	------	0	------	0	0	------	0	0	------
South Dakota:											
Aberdeen [1]	0	------	------	1	------	0	[1] 0	------	0	0	------
Sioux Falls	0	------	0	0	0	4	0	0	0	0	8
Nebraska:											
Lincoln	0	------	------	0	------	1	0	0	------	1	------
Omaha	0	------	0	0	3	2	0	1	0	4	51
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	7
Topeka	0	------	0	0	0	5	0	0	0	0	16
Wichita	0	------	0	1	1	0	0	0	1	2	14
Delaware:											
Wilmington	0	------	0	0	1	0	0	0	0	2	20
Maryland:											
Baltimore	0	1	1	1	4	2	0	12	0	49	171
Cumberland	0	------	0	0	0	0	0	0	0	1	8
Frederick	0	------	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	0	------	0	5	6	5	0	1	0	29	147
Virginia:											
Lynchburg	3	------	0	3	1	0	0	0	0	38	14
Norfolk	0	------	0	0	1	1	0	1	1	1	29
Richmond	1	------	0	0	1	0	0	0	0	3	55
Roanoke	0	------	0	6	0	1	0	2	1	3	7
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	1	0	12
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	------	------	0	------	1	------	------	0	------	------	17
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	1	0	------
Raleigh	0	------	0	0	0	0	0	0	1	1	10
Wilmington	0	------	0	1	1	0	0	0	0	0	9
Winston-Salem	0	------	0	0	1	0	0	2	0	0	14
South Carolina:											
Charleston	0	4	0	0	0	0	0	0	0	1	24
Florence	0	------	------	0	------	0	0	------	0	0	10
Greenville	0	------	0	0	0	0	0	0	0	0	8
Georgia:											
Atlanta	0	1	0	0	3	6	0	8	0	2	67
Brunswick	0	------	0	0	0	0	0	0	0	0	4
Savannah	0	------	0	1	0	0	0	3	0	2	16
Florida:											
Miami	2	------	0	0	0	3	0	2	0	11	26
Tampa	0	------	0	3	1	0	0	1	1	0	29
Kentucky:											
Ashland	0	------	0	0	0	0	0	1	0	0	8
Covington	0	------	0	0	3	3	0	1	0	0	8
Lexington	0	------	0	1	0	2	0	2	2	0	17
Louisville	0	------	0	0	5	1	0	3	0	35	49
Tennessee:											
Knoxville	0	------	0	0	2	1	0	0	0	0	20
Memphis	0	------	0	0	0	2	0	2	0	22	71
Nashville	0	------	0	0	1	3	0	2	0	5	36
Alabama:											
Birmingham	0	2	0	0	3	5	0	6	0	3	83
Mobile	1	------	0	0	1	1	0	0	0	0	19
Montgomery	2	------	------	0	------	1	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	1	------	0	0	------	1	0	------
Little Rock	0	------	0	0	2	0	0	1	1	3	4

[1] The number of cases of smallpox in Aberdeen, S. Dak., for the week ended July 1, 1939, PUBLIC HEALTH REPORTS, July 21, p. 1358, should have been given as 5 instead of 25.

City reports for week ended Aug. 5, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	7
New Orleans	3	1	1	0	11	5	0	11	1	91	160
Shreveport	0	------	0	0	4	0	0	0	0	1	39
Oklahoma:											
Oklahoma City	0	------	0	0	3	1	0	3	1	0	40
Texas:											
Dallas	1	------	0	0	1	0	0	2	0	3	54
Fort Worth	0	------	0	0	2	1	0	1	0	1	28
Galveston	0	------	0	0	2	0	0	0	0	0	12
Houston	0	------	0	0	3	0	0	3	10	4	72
San Antonio	0	------	0	0	3	0	0	3	0	0	57
Montana:											
Billings	0	------	0	0	1	0	0	0	0	1	10
Great Falls	0	------	0	5	0	1	0	0	0	0	8
Helena	0	------	0	0	1	0	0	0	0	0	6
Missoula	0	------	0	0	0	0	0	0	0	0	10
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	6
Colorado:											
Colorado Springs	0	------	0	0	0	8	0	1	0	0	15
Denver	8	------	0	2	1	3	0	4	0	9	76
Pueblo	0	------	0	0	1	0	0	0	0	6	10
Utah:											
Salt Lake City	0	------	1	3	1	2	0	3	0	27	30
Washington:											
Seattle	0	------	0	33	4	0	0	2	0	9	77
Spokane	0	------	0	5	2	1	0	1	0	0	36
Tacoma	0	------	0	5	0	0	0	0	0	2	32
Oregon:											
Portland	0	------	0	8	2	1	0	1	0	2	79
Salem	0	------	--------	0	------	0	0	------	0	0	--------
California:											
Los Angeles	6	1	0	37	5	6	0	17	2	20	263
Sacramento	0	------	0	6	2	1	0	1	0	2	21
San Francisco	1	------	0	1	1	0	0	5	1	6	129

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Iowa:			
Boston	0	0	1	Des Moines	0	0	1
Connecticut:				Missouri:			
New Haven	1	1	0	St. Louis	0	0	1
New York:				Nebraska:			
Buffalo	0	0	1	Omaha	0	0	4
New York	4	0	0	Maryland:			
Syracuse	0	0	1	Baltimore	0	0	1
New Jersey:				North Carolina:			
Camden	0	0	2	Raleigh	0	1	0
Pennsylvania:				South Carolina:			
Philadelphia	0	0	4	Charleston	0	0	5
Pittsburgh	1	0	4	Georgia:			
Ohio:				Atlanta	0	0	2
Cincinnati	1	0	4	Savannah	0	0	1
Cleveland	0	0	3	Texas:			
Toledo	0	0	1	San Antonio	1	0	1
Illinois:				Colorado:			
Chicago	0	0	2	Pueblo	0	0	1
Michigan:				California:			
Detroit	0	0	37	Los Angeles	0	0	16
Wisconsin:				Sacramento	0	0	1
Milwaukee	1	0	0				
Minnesota:							
St. Paul	0	0	3				

Encephalitis, epidemic or lethargic.—Cases: New York, 3; Philadelphia, 1; Scranton, 1; Minneapolis, 1; St. Louis, 1; Grand Forks, 1; Omaha, 1; Topeka, 1.

Pellagra.—Cases: Charleston, S. C., 1; Savannah, 2; Birmingham, 1; Dallas, 1.

Rabies in man.—Cases: Pittsburgh, 1. Deaths: Pittsburgh, 1; Memphis, 1.

Typhus fever.—Cases: New York, 2; Charleston, S. C., 8; Savannah, 3; Tampa, 3; Mobile, 3; Fort Worth, 1; Galveston, 8; Houston, 9.

FOREIGN REPORTS

FINLAND

Communicable diseases—June 1939.—During the month of June 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	145	Poliomyelitis	9
Influenza	1,499	Scarlet fever	674
Paratyphoid fever	62	Typhoid fever	8

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths, P, present]

Place		Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Week ended— May 1939: 6	May 13	May 20	May 27	June 1939: 3	June 10	June 17	June 24	July 1939: 1	July 8	July 15	July 22	July 29
Afghanistan	C																	
	D														82			
Kandahar Province:																		
Greshk	C													5				
Tchakhansour	C															P		
Ceylon:																		
Batticaloa	C																	
	D														1			
China: [1]																		
Canton	C							P	9									
	D								6									
Fatshan	C							P										
	D								154									
Foochow	C	6																
	D	2																
Hainan Island	C							P										P
Hankow	C																	
Honan	C							P										
Hong Kong	C	5				2	4	9	10	16	27	20	50	100	60	17	22	15
	D	2				1	2	10	6	9	13	20	38	62	38	11	19	6
Macao	C				1		1	9	10	9	20	30		95	103	59	81	65
	D						1	5	6	6	11	16		68	58	32	30	
Shanghai	C										1						2	
Whampoa	C							P										
India	C	3,871	4,915	6,667	11,896	1,772	1,827	1,918	1,600									
	D	1,924	2,567	3,013	5,502	887	807	891	748									
Akyab	C					1				1					1			
Allahabad	C			[2] 1					1				[3] 1				7	17
Assam	C	427	113	238	220	35	69	185	116	115	105	58	43	43	20			
	D	295	67	98	105	17	26	75	38	39	41	23	14	22	7			
Bassein	C			1	2	2		2	2	3	1	[3] 1						
Bengal Presidency	C	4,477	3,157	4,941	8,754	911	915	699	668	550	466	430	594	703	820			
	D	2,307	1,606	2,297	4,174	449	417	337	301	248	199	198	229	325	375			

[1] During the week ended Aug. 5, 26 cases of cholera were reported in Hong Kong, and 20 in Macao, China.

[2] Suspected.

[3] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

[C indicates cases, D, deaths; P, present]

Place		Jan. 1-28, 1939	Jan. 29-Feb. 25, 1939	Feb 26-Mar. 25, 1939	Mar. 26-Apr. 29, 1939	Week ended— May 1939 6	May 13	May 20	May 27	June 1939 3	June 10	June 17	June 21	July 1939 1	July 8	July 15	July 22	July 29
India—Continued.																		
Bihar Province	C						142	203	239	263								
	D						54	84	126	107								
Bombay Presidency	C	258	205	98	157	23	44	67	62	35	27	10	26				237	
	D	111	87	34	61	9	20	30	24	16	12	5	4				98	
Calcutta	C	59	118	315	963	196	245	196	184	99	140	111	243	206	169	123	88	
Cawnpore	C			3	3		1	3		3	2	1	4	1	3		1	
	D			1			1		1		1	1	2	1	2		1	
Central Provinces and Berar	C	95	61	71	184	55	57	39	43	7	11	7	9		7	16	22	5
Chittagong	C			2	12	[3] 1	2	5	1	1	1		[3] 1				2	
Delhi	C																1	
	D				1													
Howrah	C	98	255	482	785	128	95	94	103									
Karachi	C																1	
Madras Presidency	C	1,464	997	201	84	6	20	24	10	16							20	
	D	627	496	93	30	3	4	9	8	5							6	
Madras	C		3	2								1						
	D		2															
Negapatam	C	2																
Orissa Province	C	36	73	56	161	27	46	7	31	25	40	64	41	99	127	168	165	
Rangoon	C				4	7		2		2		[3] 1	1					
Tirumalaivasal	C		5															
India (French):																		
Chandernagor Territory	C	2	1	16	22													
Karikal Territory	C	5	41															
Pondichery Province	C				1													
Tonkin Province	C																1	
Iran: Zabol	C													1				
Siam:																		
Bangkok	C				4		1											
Smud Prakar Province	C			5	13													
On vessels:																		
S. S. *Erinpura* at Rangoon from Calcutta	C							1										
S. S. *Amra* at Calcutta from Rangoon	C										1							
S. S. *Tin How* at Singapore from Hong Kong	C														1			

[3] Imported.

PLAGUE [1]

[C indicates cases; D, deaths; P, present]

Place		Jan. 1-28, 1939	Jan. 29-Feb. 25, 1939	Feb. 26-Mar. 25, 1939	Mar. 26-Apr. 29, 1939	Week ended— May 1939: 6	13	20	27	June 1939: 3	10	17	24	July 1939: 1	8	15	22	29
Algeria: Algiers	C			1														
Argentina	C															1		1
	D															1		1
Belgian Congo [2]	C			3			1	4	2	11							1	
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa:																		
Kenya	C		3															
Nyasaland	C																P	
Uganda	C	14	30	24	17	2	3	4	8	2	12		8	15				
	D	14	29	24	17	2	3	4	8	2	12		8	15				
China: Manchuria.[3]																		
Dutch East Indies: Java and Madura	C	252	259	236	167													
	D	242	256	232	165													
Ecuador:																		
Chimborazo Province	C			6	18													
Riobamba	C		[4] 16															
	D		15															
Guayaquil	C			1	2													
	D				2													
Plague-infected rats			1	3														
Loja	C		[5] 4															
Pueblo Viejo	C		3															
Egypt: Asyut Province	C	1	[6] 32	22	35	3	3	1	3	2								
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector						1												
Honokaa					1													
Kapulena					2							1						
Kukaiau		6	1	3														
Paauhau Sector		3	1	5										1				
Paauilo													1					

See footnotes at end of table.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb 26–Mar. 25, 1939	Mar 26–Apr. 29, 1939	Week ended— May 1939 6	13	20	27	June 1939 3	10	17	21	July 1939 1	8	15	22	29
India	C	2,015	3,443	5,718	10,527	349	207	114	100									
	D	970	1,391	2,636	3,119	266	118	63	77									
Allahabad	D		[8] 1															
Bassein [7]	C			3							1				2			
Plague-infected rats				1														
Bihar Province	C						1	12										
	D						1	1	7									
Bombay Presidency	C	51	27	33	46	4	3	1	3	3	2		1				2	
	D	29	13	20	23	4	2	1	1	1	1						1	
Burma	C																30	14
	D																23	13
Calcutta	C				1													
Calicut	C						1											
Central Provinces and Berar	C	715	1,414	2,056	1,914	132	37	27	2	3			3					
Cochin: Plague-infected rats		1											1	1				
Coorg Province	C				4		1					1						
Delhi	C																1	
Madras Presidency	C	140	164	28	15	3		2	8	2								
	D	53	61	19	8	1		2	5	1								
Rangoon	C	3	61										1					
	D	2											1					
Indochina (see also table below):																		
Cambodia	C										1							
Pnom Penh	C				1													
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Siam:																		
Bichitr Province	C						3	1										
	D						1											
Bisnulok Province	C	1	33	1														
	D	1	5															
Lampang Province	C		1															
Prae	C	3			3													
Svargalok Province	C	11	17	2														
Tak Province	C	7	3															

Tunisia: Tunis	C				1													
Plague-infected rats		2	3															
Union of South Africa	C	8	18	22	9													
Cape Province	C	2	7	4	4	1												
Orange Free State	C		4	6	7													
Transvaal	C			7														
United States.[9]																		

[1] Including plague in the United States and its possessions.
[2] On Aug. 3, 1939, 1 case of plague was reported in Dodro, Belgian Congo.
[3] Information dated May 5 stated that 34 cases of plague with 8 deaths had occurred in Hsinking, Manchuria, since the beginning of the year.
[4] Pneumonic.
[5] Unofficially reported.
[6] Includes 4 pneumonic cases.
[7] On August 5, 1 case of plague was reported in Bassein, India.
[8] Imported.
[9] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1938 and 1939. *California*—Ground squirrels, Mar. and Apr. 18, 25, and 26, 1939; insects, March and June 8, 1939. *Idaho*—Insects, June 14, 1939. *Nevada*—Insects, Apr. 7-8, 1939; *New Mexico*—Kangaroo rat, Apr. 15, 1939; *Oregon*—Ground squirrels, June 4, 1939; insects, May and June 4, 1939; *Washington*—Rabbit, May 27, 1939; insects, May and June 27, 1939.

Place		January 1939	February 1939	March 1939	April 1939	May 1939	June 1939
Bolivia	C			[4] 1			
Brazil:							
Alagoas State	C	19	5	11	1		
Bahia State	C			1			
Parahiba State	C	1					
Pernambuco State	C	15	3	5	6		
Sao Paulo State	C				1		
Indochina: Cambodia	C		2				
Madagascar (central region)	C	79	77	52	33	16	11
	D	42	67	21	25	14	10
Peru	C	14	9	12	11	11	3
Cajamarca Department	C			3			
Lambayeque Department	C	2		1	1	1	
Libertad Department	C	11	4	1	2	3	1
Lima Department	C	1	4	2	1		1
Piura Department	C		1	5	7	7	1

[4] Pneumonic.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Jan. 1-28, 1939	Jan. 29-Feb. 25, 1939	Feb. 26-Mar. 25, 1939	Mar. 26-Apr. 29, 1939	Week ended— May 1939 6	13	20	27	June 1939 3	10	17	24	July 1939 1	8	15	22	29
Algeria: Oran Department	C				1				2				1					
Arabia: Aden	D		1															
Argentina. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
British East Africa.																		
Nairobi	C											26						
Tanganyika	C	1	174	96	146		3		6	17		4						
Canada:																		
Alberta	C		37	7									22					
British Columbia	C		4	8														
Manitoba	C	8	1	22	13	2							1					
Ontario	C		1															
Saskatchewan	C	17	10	2								1		1				
Canary Islands: **Las Palmas**	C			13														
Ceylon: Maskeliya	C			1														
China (see also table below):																		
Dairen	C	1		2	4		1	1	3	1	1			2				
Foochow	C	8		2	8	5	3											1
Hong Kong	C	18	45	45	34	3	2	5	1	1				1				
	D	13	23	49	26	5	2	1	3	1				1				
Macao	C		3															
Shanghai	C	834	274	102	50	9	4	1	4	2	2	1	3	2	1			
Swatow	C	1	3	2	7													
Tientsin	C		1		4			1			1							
Chosen (Korea). (See table below.)																		
Colombia (see also table below): **Cartagena**	D		1	2	1												1	
Dahomey. (See table below.)																		
Ecuador: **Guayaquil**	C			4	1								3					
	D			1	1								1					
Eritrea: Massaua	C															1		
France. (See table below.)																		
French Equatorial Africa: Chad	C				14													
Germany: **Hamburg**	C																2	
Great Britain: England and Wales—**Liverpool**	C	1																
Greece (see also table below):																		
Salonika	C														11	1		
Guatemala. (See table below.)																		
Guinea	C														40			

India	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
	D	1,777	2,536	3,254	4,895	1,003	1,014	1,063	971									
Allahabad	C	1		2				1						1				
Assam	C	67	58	121	225	59	56	87	50	24	36	35	32	20	7			
Bengal Presidency	C	572	1,735	2,152	3,305	411	488	393	328	230	202	184	165	164	148			
	D	203	632	724	1,242	166	169	136	134	87	78	60	70	52	60			
Bihar Province	C						603	853	904	672								
Bombay Presidency	C	1,388	1,514	3,936	6,398	1,111	1,010	937	953	806	755	642	606	527			252	
	D	187	220	558	961	155	152	136	155	118	109	82	106	115			62	
Bombay	C	12	20	56	61	9	12	6	14	9	12	9	10	15	16	5	4	
	D	8	11	21	20	4	6	2	5	7	5	6	3	9	8	5	4	
Burma	C													1	1		2	4
	D																1	2
Calcutta	C	400	776	806	910	100	70	59	69	34	40	22	31	33	32	26	12	
	D	231	451	548	676	78	54	52	51	25	31	17	22	19	20	23	7	
Cawnpore	C	4	2	5	14	7	4	2	3	1		2						
Central Provinces and Berar	C	81	198	540	1,132	184	203	284	233	265	154	174	164	119	116	62	38	
Chittagong	C		1										1					
Cochin	C		4		3								1					
Delhi	C	96	113	133	187	44	47	48	64	39	23	15	22	10	7	5	7	
Howrah	C	67	148	152	222	31	43	29					10					
Jodhpur	D						19	9	10		3	3	1		4	1	6	
Karachi	C	3	3	3	3	1	4	1	2	1						1		
Madras Presidency	C	1,058	1,389	1,400	1,020	180	170	101	94	110							55	
	D	370	233	234	241	51	41	35	28	29							8	
Madras	C	171	304	236	193	18	8	2	4	5	5		21	3	1	4	3	
Moulmein	C	1											1					
Northwest Frontier Province	C	155	113	114	110	19	10	10	47	62	37	54	12	22	15	30	19	
Orissa Province	C	338	465	699	1,039	290	155	140	137	84	117	89	86	60	111	75	95	
Punjab	C	196	329	180	191	61		41	112	97	72	45		48	24	8		
Rangoon	C	9	5	14	10	4	3	5	2	6	2	2		1			1	
Sind State	C	158	299	279	251	58	60	42	49		44	64	23	53	21	59	20	
Vizagapatam	C				6													
India (French):																		
Chandernagor Territory	C		2		4	3												
Pondichery Territory	C		6	7	3													
	D		4	3	2													
Indochina (French) (see also table below):																		
Tonkin Province	C	214	183	211	228	73		33	29	20	20	14		1		1		
Haiphong	C		2															
Hanoi	C	1	10	6	13	4		7	11		3							
Saigon-Cholon	C	6	3															
Iran	C	1		11	10		3				1		2					
Iraq	C	6	1		6					2		2	2					
Baghdad	C						1 1											
Ivory Coast. (See table below.)																		
Japan:																		
Kanagawa prefecture	C	1																
Kobe	C	4	66	16														
Kyoto	C	13	1															

See footnotes at end of table.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan. 1-28, 1939	Jan. 29-Feb. 25, 1939	Feb 26-Mar. 25, 1939	Mar. 26-Apr. 29, 1939	Week ended— May 1939 6	13	20	27	June 1939 3	10	17	24	July 1939 1	8	15	22	29
Japan—Continued.																		
Nagoya	C			1														
Osaka	C		1	1	1	1	1	2	1		1							
Taiwan.[2]																		
Tokyo	C		5		1													
Mexico (see also table below):																		
Mexico, D. F	C	1	3	6	3			1	2	2	1	2		1				
Monterrey	C	4	2	1	1													
Piedras Negras	D			1														
San Luis Potosi	D		5	3	1				1			3	1	1				
Tampico	C		7	22	1													
Morocco. (See table below.)																		
Mozambique	C			11	11	4	12	9	7	1								
Nigeria	C	320	934	884	1,261	209	197	79	29	16	22	21	17	25				
Calabar	C	1	6	5	3	42	2											
Lagos	C			1		2		2										
Port Harcourt	C	3	1	1								1						
Niger Territory. (See table below.)																		
Portugal (see also table below):																		
Lisbon	C	42	21	21	34	8	7	4	14	17	13	9	14	6	7	10	3	
Oporto	C	5	14	2	2		7	1		1	2	5	2	4			5	
Portuguese Guinea. (See table below.)																		
Salvador. (See table below.)																		
Senegal. (See table below.)																		
Siam	C	48		2	2					1				2	1		24	
Sierra Leone	C	4	9	2	8	9												
Society Islands:																		
Tahiti	C														12			
Southern Rhodesia	C	37	48		21		1	9	1			3						
Spain. (See also table below.)																		
Barcelona	C														1	4		
Malaga	D													2				
Valencia	C											1						
Straits Settlements: Singapore	C			1														
Sudan (Anglo-Egyptian)	C	28	18	17	90	6	1		5	7	1	5	2	1		1	21	3
Sudan (French):																		
Macina	C												19					
Niafunke	C												8					

Syria: Aleppo	C			1														
Turkey. (See table below.)																		
Uruguay	C			1				4										
Venezuela. (See table below.)																		

[1] Imported.

[2] Information dated Apr. 6, 1939, states that up to Mar. 31, 1939, 61 cases of smallpox were reported in Taiwan, Japan.

On vessels:

S. S. *Selandia* at Singapore from Saigon	1 case	Jan. 15, 1939
S. S. *Pottsdam* at Singapore from Yokohama	1 case	Jan. 17, 1939
S. S. *E. Sang* at Swatow from Shanghai	1 case	Jan. 18, 1939
S. S. *Maihar* at Aden from Calcutta	1 case	Jan. 30, 1939
S. S. *Alavi* at Aden from Bombay	1 case	Feb. 2, 1939
S. S. *Orange Moor* at Saigon from Shanghai	1 case	Do.
S. S. *Queen Victoria* at Victoria from Shanghai	1 death	Feb. 6, 1939
S. S. *Rugelsey* at Williamshead from Shanghai	10 cases	Feb. 19, 1939
Pilgrim ship *Tantalus* at Penang from Jeddah	1 case	Feb. 27, 1939

On vessels—Continued

Pilgrim ship *Ajax* at Penang from Jeddah	1 case	Mar. 2, 1939
S. S. *Gneisenau* at Genoa	1 case	Mar. 5, 1939
S. S. *Riley* at Fremantle from Shanghai	1 case	Do.
S. S. *Mau Sang* at Sandakan from Hong Kong	1 case	Apr. 6, 1939
S. S. *Thistleglen* at Singapore	1 case	Apr. 10, 1939
S. S. *Empress of Russia* at Hong Kong from Shanghai	2 cases	Apr. 20, 1939
S. S. *Liebenfels* at Rangoon from Moulmein	1 case	June 2, 1939
S. S. *City of Pittsburgh*, Manila, P. I.	1 case	June 28, 1939
S. S. *Atalaya* at New Orleans	1 case	July 25, 1939

Place		January 1939	February 1939	March 1939	April 1939	May 1939	June 1939
Argentina	C		3				
Belgian Congo	C	175	26			169	199
Bolivia:							
Cochabamba Department	C			8			
La Paz Department	C			8			
Oruro Department	C			1			
Potosi Department	C			1			
Santa Cruz Department	C			6			
China: Harbin	C	2	1	5	5	1	1
Chosen (Korea)	C			42			
Colombia (see also table above)	C	25					
Dahomey	C	12		4			
Ecuador: Guayaquil and vicinity	C						5
France	C	1	3				
Greece	C	12	1	38	7	11	
Guatemala	C		5		4		
Indochina (French) (see also table above)	C	312	163	515	606	671	178
	D	47	21	79	52	109	31
Ivory Coast	C	18	59	17			10
Malta	C						

Place		January 1939	February 1939	March 1939	April 1939	May 1939	June 1939
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C		[3] 15	8			
Chihuahua State—Chihuahua	C		[3] 1				
Hidalgo State	C		[3] 29	7			
Jalisco State—Guadalajara	C		[3] 1				
Mexico, D. F.	C		[3] 7	9			
Nuevo Leon State—Monterrey	C			3			
Queretaro State	C		[3] 1				
San Luis Potosi State—San Luis Potosi	C		[3] 16	11			
Sonora State—Guaymas	C			1			
Tamaulipas State—Tampico	C		9	15			
Morocco	C	2		1		6	
Niger Territory	C	48	34	40	9		3
Portugal (see also table above)	C			112			
	D			11			
Portuguese Guinea	C				115		
	D				8		
Salvador	C			1			
Senegal	C		35	66	42	55	25
Spain	C					49	
Turkey	C	58	8		59	34	
Venezuela	D	2	8	6	3	7	6

[3] For January and February.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939 1	8	15	22	29	May 1939 6	13	20	27	June 1939 3	10	17	24	July 1939 1	8	15	22	29
Algeria:																						
Algiers Department	C	9	14	29	6		6	1	8		11		15	12	28	25	9	18				
Algiers	C	2		16					5		10		12	7		7		2				
Constantine Department	C	115	90	164	30	19	38	54	54	69	13		106	42	43	56	56	33				
Bone	C	4		2	1			5	3	1												
Constantine	C	11	8	7		4	8	27		10	8		34	3		31		6				
Philippeville	C	3	1	14		2				2			7	4		1	1					
Oran Department	C	28	29	29	2	7	2	4	16	6	2		20	7	5	21	6	7				
Southern Territories	C		7	21	9		1	9	3		36		26	17		4						
Australia:																						
Brisbane	C			1													1	1				
Queensland	C		5		3	1	1				1											
Bolivia. (See table below.)																						
British East Africa Kenya	C		1				1															
Bulgaria. (See table below.)																						
Chile	C	80	49	43																		
Antofagasta Province	C	2	1		9	2		6														
Bio Bio Province	C	2	4	5																		
Cautin Province	C		2	1				1														
Coquimbo Province	C		12	2																		
Curico Province	C	15	1																			
Los Angeles	C	9																				
Nuble Province	C	2	1																			
Santiago Province	C	50	40	25				2														
Valdivia Province	C	1	1					3														
Valparaiso	C		1		1						1								1		1	3
China (see also table below):																						
Dairen	C											1	1									
Hankow	C											1				1						
Shanghai	C	6								2							12	7	14			
Tientsin	C	2			1				2		1											
Chosen (Korea). (See table below.)																						
Egypt:																						
Alexandria	C			3	4	2	1		6	5	8	3	10	9	3				1	2		1
Asyut Province	C	1	4		2			1	11	8	2	1	4	3								
Beheira Province	C	1	24	44	22	17	13	29	28	20	10	8	26	7	6							
Beni Suef Province	C												1									
Cairo	C	3	18	31	6	2	3	12	4	2	1	2	4	2			3				1	
Dakahliya Province	C		11	106	25	20	36	51	46	49	44	48	55	54	37							

Faiyum Province	C						7															
Gharbiya Province	C	15	51	245	64	104	97	48	42	50	34	76	56	45	39							
Girga Province	C	4	58	47	14	12	3	12	1	3	4	7	17	18	7							
Gira Province	C		19	16	8	2	8	21	14	9		9	4	8	11							
Kalyubiya Province	C		33	84	3	8	3	12	18	6	8	10	21	16	5							
Minufiya Province	C	3	67	101	9	6	11	25	45	40	45	19	37	21	12							
Qena Province	C			47	61	18	13	20	15	6	4	1	10	2	4							
Sharkiya Province	C		17	46	11	25	6	12	12	4	5		15	11	5							
Provinces	C	70	323	748	229	216	199	234	232	195	200	186	247	186	126	90	59	19	91	92	53	18
Eritrea: Hamasien	C			4												5						
Greece. (See table below.)																						
Guatemala. (See table below.)																						
Hawaii Territory: **Honolulu**	C	1	1	1						1						1						
Hungary	C	1		5		4			5										1			
India: Coorg Province	C			5			3								3							
Iran	C		1				1			2	9		7	6	4	2	8					
Iraq	C		2															2	1		1	1
Arbil Province	C												1	2		1	1					
Baghdad	C			1				1	2	1	1						1					
Kirkuk Province	C		1										7									
Irish Free State: Louth County—Drogheda	C																	5				
Latvia. (See table below.)																						
Libya: Suani Benaden	C	3																				
Lithuania. (See table below.)																						
Mexico (see also table below):																						
Mexico, D. F.	C	5	4	2	4	1						5	8	7	7	7		4				
Monterrey	C												1				3			3		
Nuevo Laredo	D																					
Saltillo	C														1							
San Luis Potosi	D					1				1												
Torreon	D		1					2		1											1	
Morocco	C	111	152	177	41	26	42	47	37	45	36	42	22	28	30	29		10	5	6		
Casablanca	C	1	6		2	2	4	4						1				1				
Palestine:																						
Haifa	C		1						2		2	1	1			3		1		1		1
Jaffa	C	3		1			1						2			3		5		1		1
Jerusalem	C															8		14				
Panama Canal Zone	C												1				1					
Poland	C	357	463	580	145	165	151	158	167	109	99	101	125	97	81	78	46	60				
	D	14	20	23	10	6	5	7	6	6	5		1	3	6	2	2	2				
Portugal: **Oporto**	C	2					2	1														
Portuguese East Africa: Laurenco Marques	C			2																		
Rumania. (See table below.)																						
Spain. (See table below)																						
Straits Settlements: **Singapore**	C	2	5	1			1															
Sumatra: Medan	D		1																			
Swaziland. (See table below.)																						
Syria:																						
Aleppo	C		2																			
Beirut	C			1																		
Lebanese Republic	C				1				1													
Trans-Jordan	C							7	1	5	1	3			1			1				

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan. 1–28, 1939	Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939					May 1939				June 1939				July 1939				
					1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29
Tunisia:																						
Tunis	C	43	33	64	32	21	8	16	12	6	13	16	4	1	13	2	2	14	1	1		
Provinces	C	436	506	694	185	93	221	282	292	264	248	271	223	202	228	316	221	333	202	181		
Turkey. (See table below.)																						
Union of South Africa. (See table below.)																						
Venezuela. (See table below.)																						
Yugoslavia	C	21	38	49	12	13	3	56	31	13	25	19	5	10	3	17	5					
On vessels:																						
S. S. *Stanbrook* at Mers el Kebir	C								1													
S. S. *Normandie* at Plymouth	C																	1				

Place		January 1939	February 1939	March 1939	April 1939	May 1939	June 1939
Bolivia:							
Cochabamba Department	C			1			
Potosi Department	C			7			
Tarija Department	C			1			
Bulgaria	C	8			14	1	
China: Manchuria—Harbin	C	5		23	4	16	14
Chosen (Korea)	C	78	9	106			
Greece	C	9					
Guatemala	C	9	22	25	14	4	8
Latvia	C	2			1		
Lithuania	C	30	42	32	23	6	
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C		[1] 11	2			
Hidalgo State	C		[1] 2	1			
Mexico State	C		[1] 8				
Mexico, D. F	C	2	[1] 14	9			
Queretaro State	C		[1] 4				
Mexico—Continued							
San Luis Potosi State—San Luis Potosi	C		[1] 8	3			
Tamaulipas State	C		[1] 1				
Portugal (see also table above)	C						
Rumania	C	144	121	205	28	40	36
Spain	C				4		9
Swaziland	C	1					
Turkey	C	32	46	57	62	49	
Istanbul	C	6		4	4		3
Union of South Africa:							
Cape Province	C	23	25	17	32		
Natal	C	1	3	2	35		
Orange Free State	C		1	3	4		
Transvaal	C	26		16	16		
Venezuela. Bolivar	C				1	3	

[1] For January and February 1939.

YELLOW FEVER

[C indicates cases, D, deaths; P, present]

Place		Jan. 1–28, 1939	Jan. 29–Feb 25, 1939	Feb. 26–Mar. 25, 1939	Week ended— April 1939: 1	April 8	April 15	April 22	April 29	May 1939: 6	May 13	May 20	May 27	June 1939: 3	June 10	June 17	June 24	July 1939: 1	July 8	July 15	July 22
Brazil: [1]																					
Espirito Santo State	D	4	42	21	9	6	5	7	1				[2] 1								
Minas Geraes State	D		8	3		1		1													
Para State	D												[2] 1								
Rio de Janeiro State	D	2		1																	
Colombia: Antioquia Department:																					
Caracoli	D													1			1				
San Carlos	D																1				
French Equatorial Africa:																					
Chad—Port Lamay	C	1																			
Cameroon—Bafia	C																		[6] 1		
French Guinea	C															2					
Gold Coast	C		[4] 1																		
Ivory Coast [3]	C		3			[4] 2	1	1		[4] 3			2	1	[5] 8						
	D		1																		
Nigeria	C	2	2	1																	
	D	1	2																		
Niger Territory: Tahua	C												[4] 1								1

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type.
[3] On Aug. 3, 1 case of yellow fever was reported at Dedougou, Ivory Coast.
[4] Suspected.
[5] Includes 4 suspected cases.
[6] Exact date not given.

X

Public Health Reports

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

During the week ended August 26, 391 cases of poliomyelitis were reported in the United States, as compared with 343 during the preceding week and a median of 289 cases for the corresponding week of the years 1934–38. The number of cases reported for the current week is approximately 36 percent in excess of the median for the preceding 5 years.

The States reporting the largest numbers of cases were as follows: Michigan 115 cases (with 72 in Detroit); New York 60 (of which 11 cases were reported in Buffalo and 19 in New York City); California 50 (with 9 cases in Los Angeles); Minnesota 38 (of which 9 were in Minneapolis); New Jersey 20; South Carolina 16; Illinois 14; and Pennsylvania and Texas 10 cases each. Approximately 80 percent of the cases were reported from these 9 States. Twelve States reported no cases and 13 States reported only 1 case.

In the following article and accompanying table, a summary of poliomyelitis incidence, by geographic regions, is given for the 4 weeks ended August 12.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

July 16–August 12, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of Disease." The table gives the number of cases of these diseases for the 4-week period ended August 12, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—The influenza incidence was lower during the 4 weeks ended August 12 than it was during the corresponding period in 1938,

but it was about 10 percent above the 1934–38 median incidence for this period. The South Atlantic and East South Central regions reported a larger number of cases than might normally be expected; the North Atlantic and Mountain States reported about the normal seasonal incidence, while in other regions the incidence was relatively low.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period July 16–Aug. 12, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,030	1,288	1,288	1,069	1,322	987	5,600	8,591	8,591	122	151	250
New England	16	21	52	1	38	3	899	596	596	5	6	9
Middle Atlantic	129	138	177	20	12	21	1,384	2,480	3,152	31	30	49
East North Central	136	240	216	91	90	128	600	2,328	2,571	11	21	45
West North Central	46	69	91	14	97	97	265	543	518	7	6	14
South Atlantic	284	304	230	554	324	317	409	800	677	19	29	48
East South Central	156	161	155	106	108	76	90	210	210	24	24	24
West South Central	107	217	209	177	492	212	231	184	184	16	15	14
Mountain	70	65	33	64	79	66	238	473	413	4	6	7
Pacific	86	73	83	42	82	70	1,484	977	763	5	14	15
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	783	232	1,035	3,117	3,508	3,992	178	394	239	2,001	2,322	2,704
New England	16	11	33	185	252	259	0	0	0	40	32	35
Middle Atlantic	71	34	69	637	613	1,015	0	0	0	140	171	174
East North Central	214	45	76	921	1,156	1,404	66	67	60	220	258	276
West North Central	69	28	28	359	397	419	57	99	81	128	118	203
South Atlantic	113	41	43	320	249	286	1	0	2	493	542	613
East South Central	28	28	83	176	158	158	2	14	1	337	436	488
West South Central	42	21	25	112	205	180	9	31	15	541	615	615
Mountain	22	6	13	152	163	163	12	36	40	51	84	81
Pacific	208	18	97	255	315	389	31	147	45	51	66	70

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Poliomyelitis.—The number of cases of poliomyelitis rose from 390 for the 4 weeks ended July 15 to 783 for the current 4-week period. Of the total number of cases, California reported 205, Michigan 170, South Carolina 55, New York 42, and Minnesota and Texas 32 cases each; approximately 500 of the reported cases occurred in those 6 States. Since there was no epidemic of this disease in any section of the country during 1938, that year was the lowest year of poliomyelitis incidence in the 11 years for which these data are available; therefore, the comparison with that year is not very favorable. However, there were approximately 1,600 cases reported for this

period in 1937, and the 1934–38 average incidence (1,035 cases) is more than 1.3 times the current figure.

Considering the situation in broad geographic regions, there were 208 cases in the Pacific region (including California), as compared with an average of 97 cases during the preceding 5 years; the incidence there was the highest for this period since the outbreak in California in 1934.

In the East North Central region (including Michigan) the number of cases (214) was more than 2½ times the seasonal average. In 1937 there was a minor outbreak in this region, and 357 cases were reported during the period corresponding to the present one.

In the South Atlantic region the high incidence has been confined largely to South Carolina, but the disease appears to be on a decline there, and also in Georgia where a few more cases than normally occur have been reported.

The West South Central and Mountain States reported about twice the average number of cases, and the West North Central States reported about 2½ times the 1934–38 median incidence for this period.

In the New England and East South Central regions the incidence was relatively low, and the Middle Atlantic region reported about the normal seasonal incidence.

The summer rise in the incidence of poliomyelitis has, during recent years, reached its peak by about the third week in September. If the current incidence follows the same pattern a further increase of the disease may be expected within the next few weeks.

Diphtheria.—The favorable record of diphtheria continued during the current period. The reports showed 1,030 cases, which marks a new low for this season of the year. The South Atlantic and Mountain regions reported slight increases over the normal seasonal incidence, and the East South Central and Pacific regions reported approximately the 1934–38 average incidence for this period, but in all other regions the number of cases was relatively low.

Measles.—The incidence of measles was comparatively low. For the 4 weeks ended August 12 there were 5,600 cases reported, as compared with approximately 8,600 during 1938, which figure also represents the 1934–38 average incidence for this period. The incidence was especially high for this season of the year in the Pacific region, and slightly above normal in the New England and West South Central regions, but in all other regions the numbers of cases fell considerably below the preceding 5-year average incidence for the corresponding period.

Meningococcus meningitis.—The incidence of this disease remained at a very satisfactory level in all sections of the country. For the current 4-week period there were 122 cases reported, which was only

about 80 percent of the number reported for the corresponding period in 1938, and less than 50 percent of the 1934–38 median figure for this period. The nearest approach to the current figure in the 11 years for which data are available was in 1934, when 130 cases were reported for the period corresponding to the current one.

Scarlet fever.—This disease continues at a favorable level. The number of cases (3,117) reported for the current period represents the lowest incidence for this disease during recent years. A few more cases than might normally be expected were reported from the South Central regions, but in all other regions the incidence was considerably below the seasonal average for this period.

Smallpox.—After a period of relatively high incidence the number of cases of smallpox has dropped considerably below the normal seasonal level. With the exception of the year 1934, when 113 cases were reported for this period, the current incidence (178 cases) is the lowest for this period in the 11 years for which these data are available. In 1935 smallpox became unusually prevalent in the Pacific and Mountain regions and later spread into the North and South Central regions, to which it has remained largely confined. The incidence in the Atlantic Coast region, with the exception of a few scattered cases, has remained at about the normal average level.

Typhoid fever.—During the current 4-week period 2,001 cases of typhoid fever were reported, as compared with 2,322, 2,704, and 2,058 for the corresponding period in 1938, 1937, and 1936, respectively. Each section of the country except the New England reported a relatively low incidence, and for the country as a whole the number of cases was about 75 percent of the 1934–38 average incidence for this period.

MORTALITY, ALL CAUSES

The average mortality rate in large cities for the 4 weeks ended August 12, based on data received from the Bureau of the Census, was 9.7 per 1,000 population (annual basis). The current rate is the lowest for this period since 1932, when the rate was also 9.7.

"INFLUENCES" OF BREAST-CANCER DEVELOPMENT IN MICE [1]

By John J. Bittner, *Research Fellow, National Cancer Institute, United States Public Health Service, and Research Associate, Jackson Memorial Laboratory, Bar Harbor, Maine*

It has been apparent for several years that at least two factors must be considered in the etiology of breast cancer in mice, heredity and ovarian secretion. Before considering any experiment let us judge

[1] This work has been assisted by a grant in aid from the National Cancer Institute.

the results on the basis of a theory of breast-cancer etiology on the assumption that three "influences" must be present for the transmission of this type of neoplasm.

These may be:

1. A "breast-cancer-producing influence" which is transmitted in the milk of potentially cancerous females. The nature of the "influence" has not been determined; that it acts as a "catalyst" and occurs in many if not all of the organs seems probable.

2. A breast-cancer susceptibility which is transmitted as a dominant complex. The evidence is in accord with the theory that only one factor is involved, but other explanations may be possible. Further work is under way to test this point.

3. A hormonal influence stimulating the mammary tissue may or may not result from the production of young, depending on the strain of mice studied. Strains having a high cancer incidence in virgin females obviously have this "influence" in sufficient amount to stimulate the growth of the mammary gland tissue to a point necessary for the cancerous change to take place in the presence of the other essential influences.

The experiments of Loeb (*48*, *49*), Cori (*44*), and Murray (*52–54*) on castration have demonstrated the part played by the ovarian hormones; a reduction in the amount of secretion resulted in a reduction in the breast-tumor incidence. The earlier the animals were spayed the more significant was the reduction in the proportion of animals showing tumors.

The amount of estrogenic hormones needed to stimulate mammary gland development in normal virgin female mice apparently depends on the strain. Some strains have a high incidence of breast tumors in virgin females; other strains have a very low ratio (*31*, *39–42*, *44*, *45*, *46*, *48*, *49*, *50*, *54*). It has not been determined whether the amount of hormones secreted by the virgin females of a stock which shows a high incidence in such animals is excessive, or whether the amount of stimulation required by the mammary gland is reduced to a minimum. The dba line is such a strain. The breast-tumor incidence was reduced to a very low percentage by Murray (*26*, *53*), following the castration of females; whereas Little (*38*), by transplanting fertilized ova into low-cancer females, with the complete elimination of nursing by the high-tumor mothers, showed that the females which survived and were used as normal breeders did not develop breast tumors. In the first group the hormonal stimulation would be lacking, and in the second series the milk influence was not present, but similar results were obtained. The conformity between Little's results (*38*) and the foster-nursing experiment of Andervont and McEleney (*31*) for C_3H mice is significant when it is considered that

in the latter work the young were permitted to nurse their high-tumor stock mothers for a short time before being transferred. A similar decrease in the breast-tumor ratio of "A" stock breeding females was obtained following the foster nursing of one generation of young by low-cancer strain females (*32–38*). Of special interest is the fact that when breast tumors developed in the progeny of tested noncancerous fostered females they were not transmitted.

When estrogenic hormones are injected in large amounts over a long period of time, Lacassagne (*5*) and others [2] have found that breast tumors could be produced in males and females of strains which normally gave rise to this type of tumor. Strains showing a "medium" incidence of tumors in breeding females showed a lower ratio in the injected mice than did the high-tumor strains; in one experiment only the females developed tumors (Bonser, *1*, *2*).

The carcinogenic action of estrogenic hormones was not specific, however, for the development of mammary carcinoma only. Cori (*44*), Gardner, Smith, Strong, and Allen (*4*), Loeb, Burns, Suntzeff, and Moskop (*9*) and Lacassagne (*7*, *8*) have observed the development of sarcoma and other types of neoplasms not characteristic of the stock tested. Such tumors were usually observed in strains which showed a low or medium breast-tumor ratio. Mice of high breast-tumor stocks as a rule developed breast tumors at an early age, but Gardner and his associates (*4*) recorded the development of spindle-cell sarcoma in C_3H males.

Stagnation of milk, observed by Bagg (*11*) and Bogen (*15*) to be responsible for cancer development in some animals, was demonstrated by Fekete and Green (*16*) to hasten the development of tumors in the dba ("D") high-tumor line, but was unable to overcome the resistance of the C57 black ("B") low-cancer strain mice. By subjecting the C57 black mice to a "functional test"—rapid production with the elimination of nursing—Bagg (*12–14*) found that some females developed breast tumors. This work was repeated by Little and Pearsons (*17*) with no increase in the cancer ratio over that recorded for the control animals. When "B" stock animals are fostered to high-cancer strain females there may (*35*) or may not (*31*) be a slight increase in the breast-tumor ratio. As different sublines of this strain were used in the forced breeding and foster-nursing experiments, this may offer an explanation for the small number of tumors which were recorded. One spontaneous breast tumor had been observed in the control line for the foster-nursing work in which tumors were noted (*47*). A strain of low-cancer mice, such as the C57 black stock, which apparently lacks the susceptibility factor, does not give an increase over the normal breast-tumor ratio when

[2] For a review of this subject see Gardner (*3*).

injected with an extensive amount of estrogenic hormones, as stated by Suntzeff, Burns, Moskop, and Loeb (*10*). (See Lacassagne (*6*) for the injection of other "refractory" strains.)

Thus, a reduction in the breast-tumor incidence in *virgin* mice of high-tumor strains may be secured by the removal of the glands secreting the estrogenic hormones; a similar reduction may be obtained in *breeding* females of the same or other high-cancer stocks by controlled nursing. The injection of a large amount of estrogenic hormones will produce breast cancer in strains, males and females in some lines, which develop them spontaneously. Similar injections have not as yet broken down the resistance or nonsusceptibility of low-cancer (refractory) stock mice. By the injection of a sufficient amount of estrogenic material it may yet be possible to overcome the lack of the cancer constitution in low-tumor strain individuals, at least in some sublines of a strain such as the C57 black stock. Likewise, an excessive amount may cause the development of mammary carcinoma in high-cancer strain animals which lack the milk influence as the result of foster nursing, especially in lines which show a high ratio in virgin females.

Reciprocal crosses between high and low breast-cancer strains of mice have given conclusive data that the maternal parent from the high-cancer strain contributed more than the paternal parent in the development of breast cancer (*18–30*). Murray and Little (*28*) and Korteweg (*23*, *24*) have assumed that the cytoplasmic difference of the ova of the high and low breast-tumor females might explain the results. The foster-nursing work on pure-strain animals indicated that some "influence" was transmitted through the milk of high-cancer mothers which was absent from low-cancer females (*32–38*). Confirmatory evidence was obtained by Andervont and McEleney (*31*). There is no reason to believe that the composition of the milk which the animals obtained while nursing changed in any way the composition of the estrogenic hormones secreted by the individuals. It was determined by using first-generation animals that the chromosomal contribution of the high-tumor male and female parents was probably identical; only the contents of the milk of the high and low breast-tumor mice differed (*35*, *37*). As tumors were observed in the F_1 mice it was probable that the breast-cancer susceptibility was transmitted as a dominant complex by mice of both sexes of the high-tumor stock.

First generation mice obtained by crossing the high tumor "A" and the low tumor "B" or C57 black strains would inherit the breast-cancer susceptibility from the "A" stock parent (males as well as females). As the "A" stock virgin females (*41*, *42*) show a low breast-tumor ratio, the hybrids must be used as breeders to insure the stimulating effects of the hormonal influence. Hybrids which had

either "A" or "B" stock maternal parents and were nursed by "A" stock females showed high tumor ratios. Hybrids which were nursed by "B" stock females had low tumor ratios regardless of their maternal parent. Thus, the breast-tumor ratio in hybrids, as well as pure stock animals, having the cancer susceptibility complex and the hormonal influence may be increased or decreased as the result of foster nursing.

This theory of breast-cancer etiology would not account for growths which are not inherited, such as those occasionally observed in low-cancer strains. They apparently result from other causes. Likewise, the tumors which develop in the descendants of noncancerous fostered high-tumor stock females are not transmitted to their progeny.

To summarize, it may be said that in high breast-tumor strains which have the breast-cancer susceptibility, the relationship between the milk and the hormonal influences varies with the strain of mice studied. In some stocks the hormonal stimulation may apparently be lacking (as in virgin females) yet cancer develops, but at a later age than in breeding females. Other strains require the production of young before a high-tumor percentage is attained. Both types of high-tumor strains may be changed to low-tumor strains by foster nursing and by reversing this phase the original ratio may be restored. The injection of estrogenic hormones may produce breast tumors in males and females of high breast-tumor strains but growths may develop only in females of strains with a medium tumor incidence. No increase was noted when low-tumor stock mice were tested. The slight difference in the forced breeding and foster-nursing experiments when low-tumor mice were used might have resulted from the use of different sublines of the same strains. The use of hybrid females in high×low tumor crosses has given evidence which indicates that the breast-cancer susceptibility is inherited as a dominant complex and may be transmitted by males and females of the high-tumor stock.

Equations expressing the results in accordance with this hypothesis for breast cancer (milk influence, inherited susceptibility, and hormonal influence) for the various experiments would be as follows:

1. High-tumor strains with high virgin tumor incidence:[3]

   Milk×susceptibility×hormonal (virgin)=High ratio (*53*, *26*, *31*).
   Milk×susceptibility×hormonal (breeding)=High ratio (*54*, *31*).
   Milk×susceptibility×injected hormones=High ratio (*10*).
   Milk×susceptibility×castration=Low ratio (*52*, *53*).
   Nonmilk×susceptibility×hormonal (breeding)=Low ratio (*38*, *31*).
   Nonmilk×susceptibility×injected hormones=??

[3] References are limited to the same stocks.

2. High-tumor strains with low virgin tumor incidence:
Milk × susceptibility × hormonal (virgin) = Low ratio (*41*, *42*).
Milk × susceptibility × hormonal (breeding) = High ratio (*39*, *42*).
Milk × susceptibility × injected hormones = High ratio (*10*).
Milk × susceptibility × castration = ??
Nonmilk × susceptibility × hormonal (breeding) = Low ratio (*32–38*).
Nonmilk × susceptibility × injected hormones = ??
3. Low-tumor (refractory (?)) strains:
Nonmilk × nonsusceptibility × hormonal (virgin) = Low ratio (*26*, *47*).
Nonmilk × nonsusceptibility × hormonal (breeding) = Low ratio (*47*).
Nonmilk × nonsusceptibility × injected hormones = Low ratio (*10*).
Milk × nonsusceptibility × hormonal (breeding) = Low ratio (*35*, *31*).
Milk × nonsusceptibility × injected hormones = ??
4. Hybrids: "A" stock ♀♀ × "B" stock ♂♂ (*43*, *37*):
First generation:
Milk × susceptibility × hormonal (virgin) = 4.5 percent.
Milk × susceptibility × hormonal (breeding) = 94.9 percent.
Nonmilk × susceptibility × hormonal (breeding) = 0.7 percent.
Second generation:
Milk × 3+ : 1− × hormonal (virgin) = 1.7 percent.
Milk × 3+ : 1− × hormonal (breeding) = 71.4 percent.
5. Hybrids: "B" stock ♀♀ × "A" stock ♂♂:
First generation:
Nonmilk × susceptibility × hormonal (virgin) = 0.0 percent.
Nonmilk × susceptibility × hormonal (breeding) = 1.9 percent.
Milk × susceptibility × hormonal (breeding) = 89.8 percent.
Second generation:
Nonmilk × 3+ : 1− × hormonal (virgin) = 0.0 percent.
Nonmilk × 3+ : 1− × hormonal (breeding) = 0.0 percent.

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THE INFLUENCE OF FOSTER NURSING UPON THE INCIDENCE OF SPONTANEOUS BREAST CANCER IN STRAIN C_3H MICE [1]

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Studies in genetics made during the past few years have shown that the occurrence of spontaneous breast tumors in mice is dependent upon influences transmitted through the mother, and that at least some of these influences are extrachromosomal. When mice of high and of low incidence of mammary cancer were crossed, the incidence

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of breast tumors in the resultant hybrids was high if the mother came from the high-tumor strain, but low if the mother was of the low-tumor strain. These observations, calling attention to the presence of an extrachromosomal factor, were first published in preliminary form by the staff of the Jackson Memorial Laboratory (*17*) and independently by Korteweg (*12*), and later detailed reports were presented by Murray and Little (*14*, *15*, *16*) and by Korteweg (*13*). The results have been confirmed by other investigators (*4*, *5*, *10*).

Efforts to elucidate the problem led to the interesting investigations of Bittner (*3*, *6*, *7*), who found that when newborn mice of a strain with a high incidence of breast tumors were removed from their mothers and suckled by foster mothers belonging to a strain with a low incidence of mammary tumors, the resultant foster-nursed animals had a low occurrence of spontaneous breast cancer. Bittner (*8*, *9*) has confirmed his earlier observations by using hybrid mice derived by reciprocal crossing of high-tumor strains and low-tumor strains. Apparently there is some agent (or agents) in the mother's milk which exerts a profound influence upon the occurrence of spontaneous breast tumors in mice.

In a previous preliminary publication (*2*) confirmation of Bittner's work was reported. The experiment has been concluded and is now presented in full.

Mice of strains C_3H and C57 black were used as the high and the low-tumor line. Breeding females of strain C_3H have a breast-tumor incidence of virtually 100 percent at an average age of 8 to 9 months (*1*) while, according to publications from the Jackson Memorial Laboratory (*6*, *7*, *11*, *15*, *16*), breeding females of the C57 black strain have less than 1.0 percent incidence of this type of cancer.

Brother-sister mating of both strains was started in December 1936, and gestation occurred 3 to 5 weeks later. The pregnant mice were examined twice daily to see whether they had given birth to litters. As the C_3H young were born, they were transferred to C57 black mothers, and as the C57 black mice were born, they were transferred to the C_3H mothers; 51 foster-nursed C_3H females and 44 foster-nursed C57 black females were thus obtained. Each of these foster-nursed females was bred and was permitted to raise one litter.

At the time of the earlier report (*2*) the mice were 13 to 13.5 months of age, and 11, or 21.5 percent, of the C_3H mice and none of the C57 blacks had developed breast tumors. The experiment was terminated on December 28, 1938, when 16 surviving strain C_3H mice were from 22.5 to 23 months of age and all were free from mammary cancer; all of the C57 black mice had died by this time.

Of the 51 strain C_3H mice foster-nursed by C57 black mice, 23, or 46 percent, developed spontaneous breast tumors at an average

age of 13.3 months. Since practically all breeding females of the C_3H strain develop breast tumors at an average age of 8 to 9 months, it is apparent that foster nursing by C57 black mice had a decided influence upon the occurrence of breast cancer in C_3H animals.

TABLE 1.—*Summary of an experiment in which C_3H mice were foster nursed by C57 black mice and vice versa*

Strain	Strain of foster mother	Number of mice	Longest possible time with mother (hours)	Number of mice developing spontaneous breast tumor	Tumor incidence (percent)	Average tumor age (months)	Number which died or were killed without breast tumor	Average age of mice dying or killed without breast tumor (months)
C_3H	C57 black	12	7	3	25.0	13.1	9	21.5
C_3H	C57 black	16	17	4	25.0	15.9	12	21.3
C_3H	C57 black	19	24	12	63.1	13.2	7	22.8
C_3H	C57 black	4	48	4	100.0	11.2	0	....
C57 black	C_3H	19	17	1	5.3	20.5	18	[1] 15.6
C57 black	C_3H	15	24	2	13.3	17.7	13	[1] 17.0
C57 black	C_3H	10	48	1	10.0	20.0	9	[1] 16.6

[1] 29 of the animals in these groups were alive when the first spontaneous breast tumor arose in a C57 black female 16 months old, and 16 were alive when the last breast tumor occurred in a 20.5-month old mouse.

Of the 44 strain C57 black mice foster nursed by C_3H animals, 4, or 9 percent, developed breast tumors at an average age of 19 months. This incidence is higher than the 1.0 percent incidence reported for this strain.

Analysis of the final results reveals that the occurrence of breast tumors in foster-nursed C_3H mice depends to a large extent upon the time the newborn mice remain with their mothers. Throughout the original phase of the experiment, pregnant mice were examined twice each day, at 9 a. m. and 4 p. m. This procedure limited the time most of the young were with their mothers to 17 hours or less, and some of the mice, born between 9 a. m. and 4 p. m., were removed from their mothers within 7 hours. On Sundays or holidays the pregnant animals were examined once daily, but always within 24 hours after the last examination; thus, this group of mice may have been with their mothers for any length of time up to 24 hours after birth. A few mice were with their mothers for 48 hours because foster mothers of the desired strains were not available when they were born. The results, compiled according to the maximum time the young may have been with their mothers, are summarized in table 1.

It is seen that of 28 C_3H mice remaining with their mothers for less than 17 hours before foster nursing by C57 black mice, 7, or 25 percent, developed breast tumors, while of 19 mice remaining with their mothers for less than 24 hours, 12, or 63 percent, developed tumors. All 4 mice kept with their mothers for 48 hours developed mammary tumors. Hence, it may be concluded that regardless of milk obtained

from C57 black foster mothers a considerable number of C_3H females developed breast tumor after obtaining a small amount of milk from their own mothers.

The average tumor age of 13.3 months in the fostered C_3H mice, when compared with the average tumor age of 8 to 9 months in unfostered C_3H mice, suggests that the amount of milk obtained from the C_3H mothers may have had some influence upon the time of appearance of breast tumors in the females of this strain. Attention is directed to the 25 percent incidence of tumors even in the two groups of fostered C_3H mice remaining with their mothers for less than 17 hours. This observation suggests that a few C_3H mice may develop spontaneous breast tumors even if no milk from their own mothers is obtained. This problem is now under investigation.

Having found that the ingestion of a relatively small amount of mother's milk results in the occurrence of breast tumors in C_3H mice, experiments were designed to answer the following questions: (1) Is the causative agent present in the first milk only? (2) Does the amount of milk ingested from the C_3H mothers determine the time of appearance of breast tumor? (3) If the first milk is not essential for tumor production, is the agent present in the mother's milk in equal quantity throughout the period of lactation? The elucidation of these questions is essential before taking steps to ascertain the chemical nature of the causative factor.

In the following experiments the mice were bred and bore one litter which was killed within 24 hours after birth.

Experiment 1.—To answer the first question, C_3H young were removed from their mothers within 1 hour after birth and given to C_3H foster mothers which had nursed their own litters for at least 5 days. There were 9 mice used in this experiment and all developed breast tumors at an average age of 8.8 months. This demonstrates that the first milk is not essential for the development of breast tumors in C_3H mice.

Experiment 2.—To obtain an answer to the second question, young C_3H mice were kept with their mothers for definite periods of time (2 to 8 days) before being foster nursed by C57 black animals. If the amount of mother's milk determines the time breast tumors occur, the mice kept with their mothers for 8 days should develop tumor earlier than those remaining with their mothers for 2 days.

TABLE 2.—*Summary of experiments 2 and 3 in which C_3H young were foster nursed by C57 black or C_3H mice*

Experiment No.	Strain of foster mother	Number of mice	Time with mother	Number which developed spontaneous breast tumor	Tumor incidence (percent)	Average tumor age (months)	Number dying without breast tumor	Average age of mice dying without breast tumor (months)
2	C57 black	15	2 to 3 days	11	74.0	9.1	4	9.1
2	C57 black	23	6 to 8 days	22	95.6	9.1	1	7.0
3	C_3H	18	Less than 17 hours.	16	88.8	8.7	2	8.2
3	C_3H	8	5 to 6 days	8	100.0	9.8		
3	C_3H	15	7 to 8 days	14	93.3	9.6	1	9.0
3	C_3H	9	16 to 18 days	9	100.0	8.9		

As shown in table 2, both groups of C_3H young which were foster nursed by C57 black mice developed tumors at an average age of 9.1 months. This indicates that the effect of strain C_3H milk was obtained when the young C_3H animals were nursed by their mothers for 2 or 3 days. The results of experiment 2, together with those presented in table 1, suggest a relationship between the amount of C_3H milk ingested and the time of appearance of breast tumor when the young are nursed by their mothers for varying periods of time up to 48 hours, as mice remaining with their mothers for less than 17 hours developed tumors at an average age of 15.9 months while those kept with their mothers for 48 to 72 hours developed tumors at an average age of 9.1 months.

Experiment 3.—To answer the third question, C_3H mice were kept with their mothers for varying periods of time (less than 17 hours to 18 days) and then foster nursed by C_3H females which had borne litters during the preceding 17 hours. If the agent is present in the milk of C_3H mice during the entire period of lactation and without any pronounced variation in amount, the fostered mice should develop tumors at approximately the same average age.

The findings, as given in table 2, suggest that the causative agent in the milk of C_3H mice is constant in amount throughout the lactation period. Tumors arose later on the average in mice kept with their mothers for 5 to 8 days, but the number of animals in the different groups is too small to attach much significance to these averages. Mice kept with their mothers for less than 17 hours or for more than 16 days suckled but one mother for the greater part of the nursing period, while those fostered at the end of 5 to 8 days of life undoubtedly obtained milk from two C_3H females. This may account for the differences in the average tumor ages in these groups of mice, but there is no definite evidence to support this postulation. It may be concluded that C_3H young, when nursed by C_3H foster mothers, develop spontaneous breast tumors at approximately the same

average age as when nursed by their own mothers only. Hence the agent in milk responsible for the occurrence of breast tumors in C_3H mice is, in all probability, present in the milk throughout the entire period of lactation.

SUMMARY

Foster nursing of C_3H female mice (high breast-tumor line) by C57 black mice (low breast-tumor line), when the C_3H young had been with their own mothers for 17 hours or less, lowered the incidence of spontaneous breast tumors in the C_3H mice from 100 percent to 25 percent. When the foster-nursed C_3H young remained with their own mothers for 24 hours or less, 63 percent developed spontaneous breast cancer. The fostered C_3H mice were permitted to raise one litter.

Foster nursing of C57 black females by C_3H mice raised the incidence of spontaneous breast tumors in the C57 black females from 1 percent, as reported in the literature, to 9 percent. The fostered C57 blacks were permitted to raise one litter.

The first milk is not essential for breast tumor production in C_3H females and the factor is apparently present in the C_3H milk throughout the period of lactation. There is some evidence that mammary tumors appear earlier in C_3H females when larger quantities of C_3H milk are ingested during the early part of the nursing period.

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EFFECTS OF OX BILE AND ESTRIN ON THE DEVELOPMENT OF TUMORS IN MICE [1]

By Floyd O. Turner, *Surgeon, United States Public Health Service*

The purpose of the experiment reported here was to acquire information regarding the roles of two biologically formed substances, bile and estrin, in relation to the development of malignant tumors in mice.

There are reasons for suspecting that bile or bile derivatives may have a role in the genesis of cancer. Brodin and his associates (*3*), for example, found that bile pigments accumulate in aged persons, that is, in those of the age in which cancer most frequently occurs. Methylcholanthrene, one of the most potent cancer-producing chemical compounds, has been prepared from desoxycholic acid, which is a constituent of bile. Cook and coworkers (*4*) have described the work of several investigators in this connection. Neufach and Shabad (*7*) state that when benzene extracts of bile of patients with malignant tumors were injected into mice, 6 of 35 animals developed tumors, "adenocancroids" of mammary glands, lymphosarcoma of the thymus, cancer of the oral cavity, and three lung tumors; no tumors, however, arose at the site of injection of the bile extract. Previously, however, Shabad (*11*) reported that 2 sarcomas arose at the site of injection of benzene extracts of the liver of a patient with carcinoma of the stomach. Bile is also involved in the excretion of certain cancerigenic hydrocarbons, as evidenced by the finding of Peacock (*8*) that after intravenous injections of colloidal anthracene and benzpyrene, there occurred changes in the fluorescence of the bile of rabbits, guinea pigs, and fowls.

The reasons for suspecting estrogens of playing a role in the causation of certain types of cancer are manifold. Lacassagne was the first to produce tumors in mice by the administration of estrin benzoate, and since that time a large number of investigators have explored the field. Gardner (*5*) has recently published a comprehensive review of the rapidly accumulating literature. Of interest to the experiment presented here was the finding of Schockaert (*10*)

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

who reported that skin cancers developed more rapidly in tarred mice which had received 20 international units of estradiol in oil weekly, than in tarred mice which had received injections of oil without estradiol. Gilmour (*6*) found that papillomas and carcinomas developed earlier in mice painted with benzpyrene and estrin than in similar mice painted with benzpyrene only. Perry and Ginzton (*9*) encountered tumors of skin, colon, cervix, lung, and breast in female mice treated with 1:2:5:6-dibenzanthracene and theelin.

The experiment presented here was designed to obtain information not only on bile alone and estrin alone, but to determine the combined effects of both substances in relation to the occurrence of tumors in mice.

EXPERIMENTAL

Experimental animals.—One hundred and twenty-six mice were used; 65 were strain C_3H and 61 were strain I. The mice were separated into groups according to sex. All mice were from 2 to 2½ months of age when the experiment was started on December 23, 1937.

The C_3H mice have been inbred in this laboratory for more than 25 generations. The females have a high (95 to 100 percent) incidence of spontaneous breast tumors and both sexes have a tendency to develop spontaneous lung tumors late in life. Observations of 165 C_3H male mice by Andervont (*1*) suggest that the males over 15 months of age probably have an incidence of about 22 percent of spontaneous hepatomas; the incidence of this type of tumor appears to be less in the females.

The I strain of mice was originated by Strong in 1927 and has been inbred in this laboratory since 1933. Breeding females have a low (less than 5 percent) incidence of spontaneous breast tumors and a medium susceptibility to spontaneous lung tumors. Most of this strain, when 12 to 14 months of age, die of an unusual hyperplasia of gastric mucosa (*12*) and many develop rectal prolapse.

Materials and methods.—The bile used was ox gall manufactured for utilization in connection with bacterial culture medium. One gram of ox gall in 10 cc. of sterile distilled water was the solution used for injection. The solution was slightly alkaline (pH 7.3).

The ketohydroxy-estratriene, hereafter referred to as estrin, was dissolved in peanut oil. This was further diluted with olive oil so that 5 international units were contained in a volume of 0.025 cc.

The compounds were administered to the animals as follows:

Group 1 (hereafter referred to as the "bile only" mice) consisted of 11 male and 10 female C_3H mice and 10 male and 10 female strain I mice. Each received a subcutaneous injection of 0.02 cc. of the bile solution in the left inguinal region twice weekly for 34 weeks. The

total amount of bile received by each animal was, therefore, 0.136 gram. The treatments were discontinued because of ulcerations at the sites of the injections.

Group 2 (hereafter referred to as the "bile and estrin" mice) consisted of 11 male and 11 female C_3H mice and 11 male and 11 female strain I mice. Each received 0.02 cc. of the bile solution subcutaneously in the left inguinal region, and at the same time a subcutaneous injection in the right axilla of 0.025 cc. of the estrin in oil. The injections were made twice weekly for 34 weeks; the total amount of estrin received by each mouse was 340 international units.

Group 3 (hereafter referred to as the "estrin only" mice) consisted of 11 male and 11 female C_3H mice and 10 male and 9 female strain I mice. Each mouse was injected subcutaneously in the right axilla with 0.025 cc. of estrin in oil, twice weekly, for 34 weeks. The total dosage of estrin given to each mouse was 340 international units.

RESULTS

At the end of the 34-week period, when the injections were discontinued, several of the mice had died. In the "bile only" group, 1 C_3H female mouse had developed mammary tumor and died, while 1 C_3H male mouse, without tumor, had been killed accidentally. Five males and 1 female of the I strain had died, probably from the combined effects of the gastric hyperplasia and ulceration due to the bile injections. In the "bile and estrin" group, 2 male strain I mice had succumbed, without tumors. In the "estrin only" group 2 female C_3H mice had developed mammary tumors and died.

The surviving mice were kept under observation until the sixtieth week after the date of the initial injection. At the termination of the experiment, less than one-third of the mice were alive. The female C_3H mice had died of mammary tumors, while most of the strain I mice had died of the effects of the gastric mucosal hyperplasia. The number of survivors is shown in the last column of table 1.

TABLE 1.—*Onset of malignancies following administration of (a) bile only, (b) bile and estrin, and (c) estrin only, twice weekly for 34 weeks, to 2 strains of mice, one of which (C_3H) has a high incidence, the other (strain I) a low incidence of spontaneous mammary tumors*

Material injected and strain of mice	Number of mice	Sex	Time of onset, in weeks, of tumors (mammary unless otherwise indicated)											Total number of tumors (all types)	Number of mice living at end of test without tumors	Number of mice killed at end of test
			31	33	37	40	43	45	47	49	53	57	59			
Bile only (total dose 0.136 gram of bile):																
C_3H	11	M	0	0	0	0	0	0	0	0	0	0	[1]7, [2]1	8	1	7
C_3H	10	F	1	0	1	2	2	0	1	0	0	0	1	8	2	8
I	10	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	10	F	0	0	0	0	0	0	0	0	0	0	0	0	4	4
Bile and estrin (total dose 0.136 gram bile and 340 international units estrin):																
C_3H	11	M	0	0	[3]1	0	0	0	0	0	0	0	[1]6	7	4	10
C_3H	11	F	5	2	3	0	0	0	0	0	0	1	0	11	0	1
I	11	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	11	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estrin only (total dose 340 international units):																
C_3H	11	M	0	0	0	1	0	0	0	0	0	[4]1, [5]1	[1]4	7	4	9
C_3H	11	F	4	2	1	1	1	0	0	0	1	0	1	11	0	0
I	10	M	0	[6]1	0	0	0	0	[1]1	0	0	0	[3]1	3	1	1
I	9	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1] Hepatoma (total, 18).
[2] Sarcoma at site of injection of bile (total, 1).
[3] Lymphoma (total, 2).
[4] Carcinoma of skin (total, 1).
[5] Adenoma of lung (total, 1).
[6] Myeloid liver (total, 1).

Seven types of malignancies occurred: (*a*) lymphomas (2); (*b*) myeloid liver (1); (*c*) hepatomas (18); (*d*) pulmonary adenomas (1); (*e*) carcinoma of the skin (1); (*f*) sarcoma at the site of the bile injection (1); and (*g*) mammary carcinomas (31). There was a total of 55 malignancies.[3]

Of the 65 C_3H strain mice, 52, or 80 percent, had tumors. Of the 61 strain I mice, only 3 developed tumors; all of these were males in the "estrin only" group.

Hepatomas.—This type of tumor occurred in 18 mice. All were males, 17 of strain C_3H, 1 of strain I. The first hepatoma, in the strain I mouse, was found in the forty-seventh week of the experiment. All hepatomas in the C_3H mice were found at necropsy of the survivors on termination of the experiment, at which time the mice were 16 months of age. Of these mice, 7 out of 9, or 77 percent, of the "bile only" group had hepatomas. Of the "bile and estrin" group, 7 out of 10, or 70 percent, had hepatomas, while in the "estrin only" group, 5 out of 10, or 50 percent, had hepatomas.

[3] All pathological diagnoses were made by Pathologists Stewart and Grady, of this laboratory, to whom I am indebted for this service.

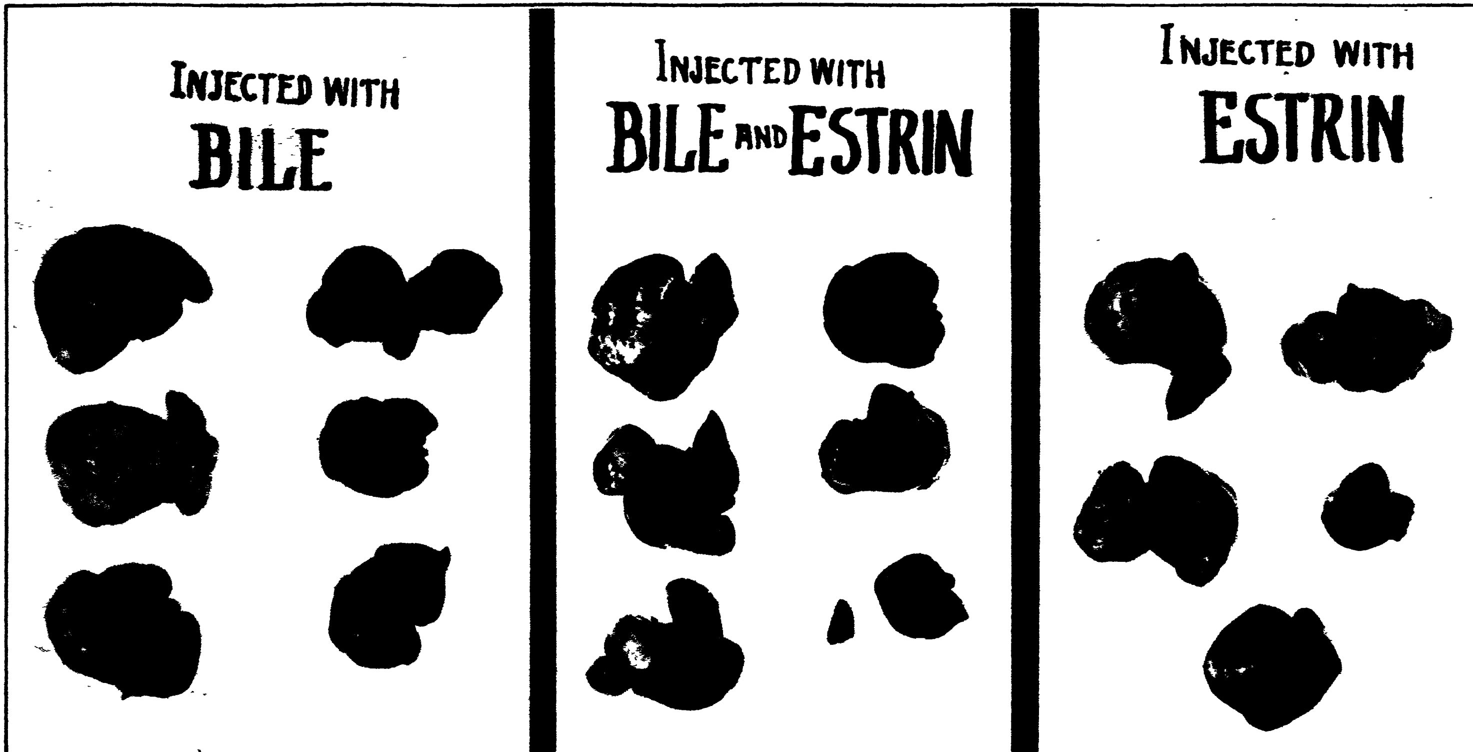

FIGURE 1.—Occurrence of hepatomas in strain C_3H male mice which had received subcutaneous injections of (*a*) bile, (*b*) bile and estrin, and (*c*) estrin.

To determine the incidence of hepatomas in normal C_3H male mice, 19 untreated control mice were kept under the same conditions until they were 16 months old. At necropsy, 5 of the 19 mice, or 26 percent, had hepatomas. None of the mice of this control group had any tumors other than hepatomas. The results are summarized in table 2.

TABLE 2.—*Hepatomas found in C_3H male mice at termination of the experiment*

Material injected semiweekly for 34 weeks	Mice living to 16 months of age		
	Number of mice	Number of mice with hepatomas	Percent of mice having hepatomas
Ox bile	9	7	77
Ox bile and estrin	10	7	70
Estrin	10	5	50
Untreated controls	19	5	26

The fact that none of the C_3H male mice, either in the experimental groups or in the control group, had died of the effects of hepatomas in 16 months is indicative of a low malignancy.

The results suggest that injections of bile into C_3H male mice have a tendency to increase the incidence of hepatomas.

Mammary carcinomas.—Ninety-four percent of the C_3H females died of mammary carcinomas. All of the female C_3H mice which had received estrin died of mammary cancers. None of the strain I females developed any tumors, but only 4 of the original 30 survived the duration of the test.

Nearly all of the C_3H females developed breast tumors but none developed hepatomas, while most of the surviving males had hepatomas. This strain of mice has an inherited tendency to develop both types of tumors, but the females develop breast cancers and succumb before reaching the age at which hepatomas occur.

It is of interest to note that, while untreated virgin C_3H female mice (*2*) develop spontaneous breast tumors at an average age of 11.5 months, the "bile and estrin" C_3H female mice in this experiment developed tumors at an average age of 8.2 months. Also, in the thirty-fourth week of the test, when the treatments were stopped, the mice which had received "bile and estrin" had four times as many mammary tumors as the "bile only" group. This suggests that 340 international units of estrin, alone or when combined with 0.136 gm. of bile, lower the average age at which breast tumors occur in virgin C_3H females. However, the number of mice is too small to permit definite conclusions in this regard.

Mammary carcinoma in male mouse.—A male C_3H mouse in the "estrin only" group developed a mammary tumor in the fortieth week, after having received only 340 international units of estrin.

This tumor is of interest since it occurred earlier and with a lower estrin dosage than usual (*5*).

Sarcoma at the site of the injections of bile.—A spindle cell sarcoma arose at the site of the subcutaneous injections of bile in one C_3H male mouse, in the fifty-ninth week. Gardner (*5*) mentions the occurrence of local tumors at the site of injections of estrogens and in one animal which had been injected with sesame oil. This raises the question as to whether such tumors, including the one mentioned here, were caused by the injected substances or whether they arose as a result of some nonspecific reaction.

Other tumors.—In the fifty-seventh week a carcinoma of the skin was found in a C_3H male mouse which had received injections of

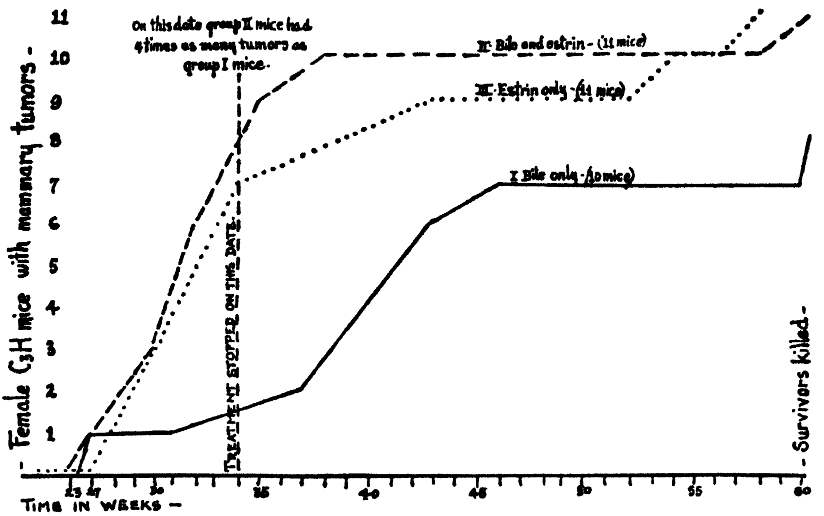

FIGURE 2.—Onset of mammary tumors in C_3H female mice given (I) bile, (II) bile and estrin, and (III) estrin in semiweekly injections for 34 weeks.

estrin only. The tumor was on the side opposite the site of injection of the estrin. One adenoma of the lung was encountered in a C_3H male mouse during the fifty-seventh week. Two lymphomas, one in a C_3H male mouse at 37 weeks, the other in a strain I male at 47 weeks, were also encountered. Table 1 shows the chronological onset of all the tumors in the test groups.

Of some interest is the finding that in 33 C_3H male experimental animals there arose six types of malignancies, while in 19 untreated control C_3H males, there arose but one type of tumor. In the experimental animals the following types of tumors were found: (1) Lymphoma, (2) subcutaneous sarcoma, (3) skin carcinoma, (4) mammary carcinoma, (5) pulmonary adenoma, and (6) hepatomas. In the control group only hepatomas developed.

SUMMARY

This experiment was designed to provide information on the roles of two biologically formed substances in the genesis of cancer.

One hundred and twenty-six males and females of two strains of mice were tested. One strain, C_3H, has a high incidence of spontaneous mammary cancer; the other, strain I, has a low incidence of this type of tumor. Semiweekly subcutaneous injections of (*a*) bile only, (*b*) bile and estrin, and (*c*) estrin only, were administered for 34 weeks. The results suggest that the time of onset of spontaneous breast tumors in C_3H females was altered by the test procedure. Also, the injections of bile appeared to have increased the incidence of hepatomas in C_3H male mice.

Two other interesting findings were the occurrence of a mammary cancer in a male mouse which had received but 340 international units of estrin, and a subcutaneous sarcoma at the site of the injections of bile.

ACKNOWLEDGMENT

The author is indebted to Mrs. Theresa Shovelton for technical assistance.

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COURT DECISION ON PUBLIC HEALTH

Ordinance regarding keeping of meat in stores or markets upheld.—(Florida Supreme Court, Division A; *State ex rel. Hogan* v. *Spencer*, 190 So. 506; decided July 11, 1939.) An ordinance of the city of Ocala prohibited the keeping of any meat in a store or market in the city or within a mile thereof unless it "has been passed on and bears the stamp of inspection provided by the laws of the United States of America governing interstate shipments of meats or has been passed on and bears the stamp of the city meat inspector of the city of Ocala." Another and earlier ordinance, dealing generally with the inspection and sale of meats, contained a provision for examination of carcasses offered for sale in the city and fixed charges therefor but did not specify that it applied to the area without the city limits. The principal distinction between them was that the earlier ordinance referred to meats "on hand for the purpose of sale" while the later ordinance referred to "meat in any store" whether kept for sale or not. Also, the earlier ordinance provided that "Carcasses * * * to be offered for sale in the city * * * shall be brought for inspection to such inspection station as designated * * * by the city council * * * and the * * * inspector shall charge" certain fees.

In a habeas corpus proceeding the petitioner, who operated a market within 1 mile of the city limits, conceded the municipality's right to regulate the sale of meat in the city and the territory within 1 mile of the corporate limits under the charter but claimed that the later ordinance was discriminatory because of the provision in the earlier ordinance for examination of carcasses offered for sale in the city and fixing charges therefor but not specifying that it applied to the area without the city limits. It was asserted that "because of this construction consumers in the outside territory would not be given the same protection as those within the city for the reason that peddlers could sell their products to the former without the precaution necessary to sales to the latter and that there is no duty to inspect the meat of the butcher who does not maintain his shop in the city." The supreme court stated that it could not follow this line of reasoning and that "Perusal of the two ordinances leads us to the definite conclusion that they were intended to establish the very wise policy of preventing sale of impure food in the territory affected." Concluding, the court said that "there is nothing in the record to convince us that petitioner may not present his meat for inspection and keep it in his market without interference by the authorities precisely as he could do were his business situated in the center of the city."

DEATHS DURING WEEK ENDED AUGUST 12, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 12, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,199	7,381
Average for 3 prior years	[1] 7,334	
Total deaths, first 32 weeks of year	272,978	265,902
Deaths under 1 year of age	477	495
Average for 3 prior years	[1] 513	
Deaths under 1 year of age, first 32 weeks of year	16,273	16,987
Data from industrial insurance companies:		
Policies in force	66,792,520	68,447,846
Number of death claims	10,821	10,549
Death claims per 1,000 policies in force, annual rate	8.4	8.0
Death claims per 1,000 policies, first 32 weeks of year, annual rate	10.6	9.4

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 19, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	18	8	------	------	18	8	13	6
New Hampshire	0	0	0	0	------	------	------	------	0	0	1	3
Vermont	0	0	1	0	------	------	------	------	121	9	11	2
Massachusetts	5	4	2	8	------	------	------	------	76	65	50	27
Rhode Island	0	0	0	0	------	------	------	------	122	16	0	0
Connecticut	0	0	0	2	------	------	1	1	50	17	3	10
MID. ATL.												
New York	4	9	17	17	[1] 4	[1] 6	([1])	[1] 1	26	65	138	127
New Jersey	4	3	5	5	2	2	3	4	18	15	15	36
Pennsylvania	4	8	19	19	------	------	------	------	9	18	51	77
E. NO. CEN.												
Ohio	5	7	18	15	------	------	------	5	8	10	11	68
Indiana	9	6	5	7	4	3	------	5	12	8	5	5
Illinois	7	11	12	17	1	2	2	3	7	10	20	52
Michigan [2]	7	7	6	7	2	2	------	------	27	26	102	36
Wisconsin	0	0	1	1	40	23	3	15	62	35	84	84
W. NO. CEN.												
Minnesota	6	3	8	2	6	3	1	------	21	11	26	11
Iowa	10	5	3	3	------	------	2	------	57	28	4	4
Missouri	3	2	9	12	------	------	30	30	1	1	8	10
North Dakota	0	0	0	0	------	------	9	1	22	3	12	8
South Dakota	0	0	0	1	------	------	------	------	0	0	------	0
Nebraska	23	6	1	2	------	------	------	------	8	2	5	5
Kansas	6	2	2	6	------	------	------	------	8	3	7	6

For footnotes see end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 19, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	------	------	------	------	20	1	------	1
Maryland [2,3]	15	5	5	5	------	------	4	2	3	1	6	6
Dist. of Col	0	0	1	3	------	------	------	------	49	6	2	4
Virginia [3]	24	13	15	17	77	41	------	------	39	21	45	43
West Virginia	13	5	8	10	30	11	11	11	8	3	3	8
North Carolina [3]	39	27	31	21	------	------	------	1	7	5	33	27
South Carolina [3]	25	9	5	5	382	140	38	50	3	1	2	5
Georgia [3]	33	20	50	25	18	11	------	------	8	5	------	------
Florida [3]	9	3	10	5	3	1	------	------	3	1	6	6
E. SO. CEN.												
Kentucky	14	8	6	8	9	5	1	1	2	1	5	22
Tennessee	19	11	9	13	7	4	13	5	7	4	27	9
Alabama [3]	26	15	34	19	32	18	17	5	11	6	4	5
Mississippi [2,3]	46	18	20	9	------	------	------	------	------	------	------	0
W. SO. CEN.												
Arkansas [3]	37	15	11	8	17	7	4	4	0	0	9	1
Louisiana [3]	22	9	19	13	12	5	4	11	22	9	2	5
Oklahoma	16	8	10	6	18	9	46	7	16	8	3	2
Texas [3]	8	10	41	39	22	27	97	40	5	6	14	14
MOUNTAIN												
Montana	0	0	0	1	19	2	7	------	84	9	18	9
Idaho	0	0	0	0	------	------	------	------	20	2	1	2
Wyoming	22	1	0	0	------	------	------	------	196	9	------	1
Colorado	10	2	6	3	5	1	------	------	19	4	5	6
New Mexico	12	1	0	2	------	------	------	------	25	2	4	8
Arizona [3]	61	5	16	1	86	7	12	5	12	1	8	6
Utah [3]	0	0	1	1	20	2	------	------	89	9	13	8
PACIFIC												
Washington	0	0	2	1	------	------	------	------	157	51	7	11
Oregon	0	0	1	1	10	2	9	8	35	7	12	3
California [3]	11	14	19	19	11	14	10	9	66	81	144	55
Total	11	272	426	401	17	351	324	319	24	598	939	939
33 weeks	15	12,061	14,515	15,112	217	151,650	46,058	104,11	427	348,447	760,580	668,262

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 19, 1939, rate	Aug 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	2	4	12	2	3	4
New Hampshire	0	0	0	0	0	0	0	1	10	1	1	2
Vermont	0	0	0	0	0	0	0	0	13	1	4	4
Massachusetts	0	0	3	1	7	6	1	1	18	15	34	37
Rhode Island	0	0	0	0	0	0	0	0	8	1	0	1
Connecticut	0	0	0	0	9	3	0	1	15	5	6	7
MID. ATL.												
New York	2.8	7	7	7	16	39	9	9	20	50	55	82
New Jersey	1.2	1	0	0	14	12	4	7	18	15	20	18
Pennsylvania	2.5	5	4	4	8	15	5	5	34	66	49	75

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 19, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934-38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934-19, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934-38, median
E. NO. CEN.												
Ohio	0	0	1	1	2.3	8	0	11	25	32	40	62
Indiana	0	0	0	0	8	2	0	8	28	19	14	14
Illinois	0.7	1	1	8	9	13	7	13	81	48	64	66
Michigan [3]	1.1	1	1	1	92	87	0	13	69	65	54	57
Wisconsin	0	0	0	0	0	0	1	1	60	84	37	37
W. NO. CEN.												
Minnesota	0	0	1	0	76	89	5	5	33	17	20	21
Iowa	2	1	2	1	0	0	2	2	24	12	7	13
Missouri	0	0	1	1	1.3	1	1	1	17	13	11	20
North Dakota	0	0	1	0	0	0	0	0	15	2	4	4
South Dakota	0	0	0	0	0	0	1	1	53	7	4	9
Nebraska	4	1	0	0	0	0	1	0	19	5	4	8
Kansas	0	0	1	1	8	3	0	2	56	20	24	18
SO. ATL.												
Delaware	0	0	0	0	39	2	0	0	0	0	1	1
Maryland [1 3]	8	1	0	8	3	1	2	5	28	9	2	9
Dist. of Col.	0	0	0	8	32	4	8	8	40	5	4	8
Virginia [3]	1 9	1	0	2	0	0	1	6	13	7	5	10
West Virginia	5	2	1	1	0	0	1	8	51	19	9	11
North Carolina [3]	1 5	1	1	1	10	7	4	5	31	21	24	17
South Carolina [3]	8	3	0	0	41	15	0	0	16	6	1	1
Georgia [3]	0	0	1	0	7	4	1	1	17	10	8	8
Florida [3]	0	0	0	0	9	8	0	1	0	0	0	8
E. SO. CEN.												
Kentucky	8	2	0	2	5	8	1	6	36	21	21	21
Tennessee	0	0	7	2	5	8	1	3	39	22	19	10
Alabama [3]	0	0	1	1	0	0	4	2	37	21	12	7
Mississippi [2 3]	0	0	1	1	2.5	1	2	2	5	2	6	5
W. SO. CEN.												
Arkansas [3]	0	0	0	0	2.5	1	1	1	10	4	13	6
Louisiana [3]	0	0	3	2	2 4	1	2	2	12	5	11	9
Oklahoma	2	1	1	1	2	1	1	0	12	6	5	7
Texas [3]	1.7	2	2	1	9	11	2	2	8	10	30	29
MOUNTAIN												
Montana	0	0	1	1	0	0	0	0	94	10	8	8
Idaho	10	1	0	0	0	0	0	0	10	1	2	2
Wyoming	0	0	0	0	0	0	0	0	0	0	0	3
Colorado	0	0	1	1	14	3	0	2	48	10	10	10
New Mexico	0	0	0	0	12	1	0	0	49	4	1	4
Arizona [3]	25	2	1	1	12	1	0	0	12	1	1	2
Utah [2]	0	0	0	0	0	0	0	0	30	8	8	8
PACIFIC												
Washington	0	0	1	0	3	1	0	3	25	8	6	11
Oregon	0	0	0	0	10	2	0	1	40	8	14	11
California [3]	0.8	1	4	3	45	55	11	25	39	47	57	57
Total	1.4	34	49	56	14	343	76	335	27	690	732	910
33 weeks	1.7	1,387	2,163	4,165	2.6	2,148	933	3,432	140	116,482	137,185	164,859

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 19, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases	1934–38, median	Aug. 19, 1939, rate	Aug. 19, 1939, cases	Aug. 20, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	4	4	181	30	15
New Hampshire	0	0	0	0	0	0	0	0	20	2	
Vermont	0	0	0	0	0	0	0	0	603	45	9
Massachusetts	0	0	0	0	4	3	2	2	106	90	71
Rhode Island	0	0	0	0	0	0	2	1	107	14	13
Connecticut	0	0	0	0	3	1	2	2	142	48	42
MID. ATL.											
New York	0	0	0	0	3	8	44	28	147	368	654
New Jersey	0	0	0	0	10	8	3	9	174	146	264
Pennsylvania	0	0	0	0	6	12	19	19	199	392	303
E. NO. CEN.											
Ohio	0	0	1	1	8	11	23	23	64	83	90
Indiana	4	3	2	0	19	13	15	9	85	57	7
Illinois	2	3	2	2	9	14	19	24	176	268	548
Michigan [2]	1	1	4	1	16	15	7	14	167	158	349
Wisconsin	5	8	0	1	0	0	4	4	251	143	427
W. NO. CEN.											
Minnesota	0	0	0	0	0	0	0	2	91	47	55
Iowa	10	5	0	0	6	3	8	8	18	9	12
Missouri	1	1	3	2	31	24	22	22	1	1	18
North Dakota	0	0	1	1	7	1	0	0	51	7	43
South Dakota	0	0	0	0	8	1	1	1	23	3	2
Nebraska	0	0	0	0	0	0	1	1	50	13	18
Kansas	0	0	1	0	8	3	11	13	45	16	44
SO. ATL.											
Delaware	0	0	0	0	20	1	1	1	197	10	4
Maryland [2, 3]	0	0	0	0	31	10	9	12	167	54	34
District of Columbia	0	0	0	0	24	3	3	3	315	39	7
Virginia [3]	0	0	0	0	52	28	18	25	94	50	43
West Virginia	13	5	0	0	40	15	35	21	27	10	20
North Carolina [3]	0	0	0	0	32	22	15	26	104	71	212
South Carolina [3]	0	0	0	0	30	11	15	18	74	27	21
Georgia [3]	0	0	0	0	53	32	24	37	37	22	22
Florida [3]	0	0	0	0	3	1	3	3	48	16	19
E. SO. CEN.											
Kentucky	0	0	0	0	87	50	48	48	76	44	49
Tennessee	0	0	0	0	40	28	30	56	97	55	50
Alabama [3]	0	0	0	0	35	20	17	17	62	35	38
Mississippi [2, 3]	0	0	0	0	18	7	6	6			
W. SO. CEN.											
Arkansas [3]	2	1	0	0	62	25	18	18	12	5	5
Louisiana [3]	0	0	0	0	51	21	15	18	24	10	28
Oklahoma	6	3	0	0	64	32	17	24	2	1	12
Texas [3]	0	0	0	0	29	35	56	56	40	48	178
MOUNTAIN											
Montana	0	0	0	1	19	2	0	5	56	6	71
Idaho	0	0	0	0	31	3	4	2	10	1	2
Wyoming	0	0	0	0	22	1	0	1	22	1	4
Colorado	0	0	1	0	24	5	1	1	39	8	58
New Mexico	0	0	1	0	37	3	9	10	62	5	29
Arizona [3]	0	0	2	0	61	5	2	2	466	38	24
Utah [2]	0	0	0	0	0	0	0	0	477	48	33
PACIFIC											
Washington	0	0	9	1	19	6	9	3	34	11	27
Oregon	0	0	0	0	20	4	1	3	65	13	22
California [3]	0	0	3	2	13	16	11	11	86	105	185
Total	1	25	30	30	20	503	554	642	108	2,673	4,181
33 weeks	10	8,657	12,693	6,067	9	7,105	8,142	8,125	155	126,631	144,015

[1] New York City only.

[2] Period ended earlier than Saturday.

[3] Typhus fever, week ended August 19, 1939, 110 cases as follows: Maryland, 2; Virginia, 1; North Carolina, 2; South Carolina, 7; Georgia, 47; Florida, 3; Alabama, 23; Mississippi, 1; Arkansas, 1; Louisiana, 2; Texas, 18; Arizona, 1; California, 2.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Aug. 26, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Week ended Aug. 19	Week ended Aug. 26
Eastern:								
New York				3	3	1		
New Jersey				4	3	7	6	1
Pennsylvania				6	5	4		1
Delaware				3			1	
Maryland			7	13	11	23	2	6
District of Columbia			2	2	2	8	1	1
Virginia			1	13	10	11	2	1
West Virginia						1		
North Carolina				3	13	13	3	2
Georgia					1	1		
Central:								
Ohio				3	2	4		3
Indiana				2	1	8	2	1
Illinois			1	1	5	7	1	
Kentucky							3	2
Tennessee					5	5	4	2
Iowa			1	10	9	6	1	
Missouri				1		4		1
Western:								
Montana	[1] 2	2	8	5	1	2		
Idaho		4	7	4	5			
Wyoming		8	14	16	5	5		
Colorado		2	8	9	4			
Arizona								1
Utah		2	5	5	6	2		1
Washington		2	8	2				
Oregon		9	16	7	2	1		

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
July 1939										
Alabama	6	41	28	1,039	138	31	7	54	0	56
Arkansas	3	14	26	879	60	72	8	11	3	85
Colorado	1	41	19		63		3	43	4	19
Indiana	5	30	38	9	29		1	103	36	31
Louisiana	1	23	62	70	416	7	2	21	0	145
Maryland	2	7	10	1	66	3	0	41	0	17
Michigan	4	21	1	12	361		84	341	27	8
Minnesota	1	8	9	10	106		13	72	24	7
Mississippi	6	44	824	7,377	306	556	3	16	0	43
New Jersey	1	21	5	1	73		6	115	0	21
New York	9	37		15	2,448		30	359	0	37
Tennessee	3	13	49	319	89	35	8	64	2	119
Vermont	0	1			255		0	6	0	20

Summary of monthly reports from States—Continued

July 1939	Cases
Actinomycosis:	
Michigan	1
Anthrax in man:	
New York	2
Chickenpox:	
Alabama	25
Arkansas	19
Colorado	39
Indiana	43
Louisiana	3
Maryland	22
Michigan	279
Minnesota	88
Mississippi	178
New Jersey	189
New York	854
Tennessee	29
Vermont	23
Dengue:	
Mississippi	1
Diarrhea:	
Maryland	83
Michigan (infant)	1
Dysentery:	
Alabama (amoebic)	2
Arkansas (amoebic)	15
Arkansas (bacillary)	125
Colorado (amoebic)	2
Colorado (bacillary)	6
Louisiana (amoebic)	3
Louisiana (bacillary)	4
Maryland (unspecified)	21
Maryland (amoebic)	5
Maryland (bacillary)	15
Michigan (amoebic)	5
Michigan (bacillary)	13
Michigan (unspecified)	5
Minnesota (amoebic)	3
Minnesota (bacillary)	1
Mississippi (amoebic)	205
Mississippi (bacillary)	1,522
New Jersey (amoebic)	1
New Jersey (bacillary)	2
New York (amoebic)	8
New York (bacillary)	37
Tennessee (amoebic)	3
Tennessee (bacillary)	150
Encephalitis, epidemic or lethargic:	
Alabama	6
Colorado	1
Louisiana	1
Michigan	3
Minnesota	2
New Jersey	3
New York	8
Tennessee	3
German measles:	
Arkansas	1
Maryland	6
Michigan	33
New Jersey	23
New York	70

July 1939—Continued	Cases
Hookworm disease:	
Arkansas	1
Louisiana	31
Mississippi	618
Impetigo contagiosa:	
Maryland	13
Tennessee	28
Jaundice:	
Maryland	1
Leprosy:	
Louisiana	1
Mumps:	
Alabama	76
Arkansas	11
Colorado	18
Indiana	40
Louisiana	2
Maryland	60
Mississippi	154
New Jersey	221
Tennessee	18
Vermont	59
Ophthalmia neonatorum:	
Alabama	2
Arkansas	1
Maryland	1
Mississippi	10
New Jersey	15
New York	14
Tennessee	3
Puerperal septicemia:	
Arkansas	1
Louisiana	7
Mississippi	34
Tennessee	1
Rabies in animals:	
Alabama	15
Arkansas	17
Indiana	41
Louisiana	4
Michigan	1
Mississippi	6
New Jersey	49
New York	[1] 16
Vermont	1
Rabies in man:	
Mississippi	1
Rocky Mountain spotted fever:	
Colorado	1
Maryland	12
Minnesota	1
New Jersey	7
New York	1
Tennessee	8
Septic sore throat:	
Arkansas	27
Colorado	9
Louisiana	2
Maryland	6
Michigan	21
Minnesota	17
New Jersey	7
New York	78
Tennessee	10

July 1939—Continued	Cases
Tetanus:	
Alabama	3
Louisiana	3
Maryland	3
Michigan	6
Minnesota	1
New Jersey	1
New York	11
Tennessee	1
Trachoma:	
Arkansas	3
Louisiana	8
Michigan	1
Mississippi	2
Trichinosis:	
New York	7
Tularaemia:	
Alabama	1
Arkansas	15
Colorado	2
Louisiana	1
Michigan	1
Minnesota	1
Tennessee	2
Typhus fever:	
Alabama	70
Louisiana	12
Maryland	1
Mississippi	2
New York	2
Tennessee	1
Undulant fever:	
Alabama	10
Arkansas	3
Colorado	1
Indiana	4
Louisiana	6
Maryland	2
Michigan	15
Minnesota	15
Mississippi	1
New Jersey	10
New York	11
Tennessee	4
Vermont	3
Vincent's infection:	
Maryland	12
Michigan	20
New York	40
Tennessee	16
Whooping cough:	
Alabama	231
Arkansas	76
Colorado	172
Indiana	568
Louisiana	289
Maryland	237
Michigan	836
Minnesota	165
Mississippi	665
New Jersey	1,086
New York	1,748
Tennessee	460
Vermont	152

[1] New York City only.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 12, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	89	83	11	356	283	258	4	352	83	1,366	--------
Current week [1]	59	21	11	218	194	171	1	346	51	1,247	--------
Maine:											
Portland	0	------	0	0	1	0	0	0	0	0	15
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	4
Manchester	0	------	0	0	0	0	0	1	0	0	18
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	1	------	1	13	3	0	0	6	0	23	157
Fall River	1	------	0	1	1	0	0	1	0	1	26
Springfield	0	------	0	0	0	0	0	0	0	1	21
Worcester	0	------	0	0	1	0	0	1	0	13	45
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	13
Providence	0	------	0	23	0	0	0	2	1	11	85
Connecticut											
Bridgeport	0	------	0	7	0	0	0	2	0	0	--------
Hartford	1	------	0	0	0	1	0	0	0	24	39
New Haven	0	------	0	6	1	0	0	0	1	12	32
New York:											
Buffalo	1	------	0	2	2	5	0	5	0	13	94
New York	7	4	1	27	87	20	0	78	10	121	1,275
Rochester	0	------	0	4	2	0	0	2	0	3	51
Syracuse	0	------	0	6	0	2	0	2	0	92	39
New Jersey:											
Camden	0	------	0	0	0	1	0	0	0	3	28
Newark	0	------	0	5	2	1	0	7	0	45	100
Trenton	0	------	0	0	2	2	0	2	0	5	50
Pennsylvania:											
Philadelphia	1	------	0	7	12	8	0	24	3	135	366
Pittsburgh	1	4	1	1	3	7	0	8	2	82	131
Reading	0	------	0	0	0	0	0	1	0	2	21
Scranton	0	------	------	0	------	1	0	------	1	7	--------
Ohio:											
Cincinnati	1	------	0	0	3	2	0	6	1	10	99
Cleveland	0	2	0	5	3	9	0	5	1	47	166
Columbus	------	------	------	------	------	------	------	------	------	------	------
Toledo	0	------	0	1	2	2	0	2	0	23	53
Indiana:											
Anderson	2	------	0	0	0	2	0	0	0	3	10
Fort Wayne	0	------	0	0	0	3	0	2	0	0	26
Indianapolis	1	------	0	0	2	4	0	5	1	35	100
Muncie	0	------	0	0	0	0	0	0	0	0	8
South Bend	0	------	0	0	0	1	0	0	0	1	21
Terre Haute	0	------	0	0	2	1	0	1	0	0	15
Illinois:											
Alton	0	------	0	0	0	0	0	0	1	0	10
Chicago	12	1	0	10	13	20	0	81	1	141	598
Elgin	0	------	0	0	0	0	0	0	0	5	9
Moline	0	------	0	0	0	0	0	0	0	1	10
Springfield	0	------	0	0	0	0	0	0	0	2	19
Michigan:											
Detroit	2	------	0	5	4	16	0	16	4	89	228
Flint	0	------	0	0	4	0	0	0	0	9	22
Grand Rapids	0	------	0	0	1	1	0	0	0	5	30
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	4	7
Madison	0	------	0	0	0	0	0	0	0	11	4
Milwaukee	0	------	0	1	3	9	0	5	0	32	79
Racine	0	------	0	0	0	0	0	0	0	6	12
Superior	0	------	0	0	0	0	0	0	0	0	8

[1] Figures for Barre and Columbus estimated; reports not received.

City reports for week ended August 12, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	3	1	1	0	1	1	0	23
Minneapolis	0	------	0	1	3	5	0	1	0	6	77
St. Paul	0	------	0	0	2	1	0	0	0	21	38
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	2	0	------	0	0	------
Des Moines	2	------	0	0	0	2	0	0	0	0	28
Sioux City	0	------	------	0	------	1	0	------	0	3	------
Waterloo	3	------	------	1	------	1	0	------	0	2	------
Missouri:											
Kansas City	0	------	0	0	8	4	0	5	0	2	83
St Joseph	0	------	0	0	2	0	0	1	1	0	25
St. Louis	1	------	0	1	3	4	0	9	7	24	170
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	0	6
Grand Forks	0	------	------	1	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	7
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Sioux Falls	0	------	0	0	0	1	0	0	0	0	9
Nebraska:											
Lincoln	1	------	------	0	------	0	0	------	0	5	------
Omaha	0	------	0	0	2	0	1	1	0	3	57
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	2
Topeka	0	------	0	0	0	3	0	0	0	1	4
Wichita	0	------	0	0	1	0	0	0	0	1	20
Delaware:											
Wilmington	0	------	0	0	2	0	0	0	0	4	14
Maryland:											
Baltimore	0	------	1	2	6	2	0	14	1	42	175
Cumberland	0	------	0	0	1	1	0	0	0	0	10
Frederick	0	------	0	0	1	0	0	0	0	0	3
Dist. of Col.:											
Washington	2	1	1	8	7	5	0	12	2	45	137
Virginia:											
Lynchburg	0	------	0	3	2	1	0	1	0	22	9
Norfolk	1	------	0	0	3	0	0	2	7	0	28
Richmond	1	------	0	2	1	2	0	0	1	2	67
Roanoke	0	------	0	5	1	0	0	0	0	2	19
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	1	0	14
Huntington	1	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	1	0	0	0	0	1	1	23
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	2	------	0	0	0	0	0	0	0	4	6
Wilmington	0	------	0	0	0	0	0	1	0	0	9
Winston-Salem	0	------	0	0	3	0	0	0	0	12	17
South Carolina:											
Charleston	1	1	0	0	2	0	0	1	2	1	24
Florence	0	------	0	0	1	0	0	0	0	0	10
Greenville	0	------	0	0	0	0	0	0	0	1	6
Georgia:											
Atlanta	0	------	0	0	3	4	0	5	2	1	73
Brunswick	0	------	0	0	0	0	0	0	0	0	5
Savannah	1	1	0	1	0	0	0	2	0	0	23
Florida:											
Miami	1	------	0	0	2	0	0	2	2	0	29
Tampa	0	------	0	1	0	1	0	2	0	0	26
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	0	5
Covington	0	------	0	0	1	0	0	3	0	2	12
Lexington	0	------	0	0	1	1	0	2	1	0	19
Louisville	1	------	1	0	4	4	0	3	1	22	69
Tennessee:											
Knoxville	1	------	0	0	1	1	0	1	0	0	27
Memphis	0	------	0	0	0	0	0	7	2	9	76
Nashville	2	------	1	0	0	0	0	1	0	1	42
Alabama:											
Birmingham	1	2	0	1	8	2	0	4	1	1	50
Mobile	1	------	0	0	1	0	0	2	0	1	15
Montgomery	0	11	------	0	------	2	0	------	0	4	------
Arkansas:											
Fort Smith	0	------	------	0	------	1	0	------	0	0	------
Little Rock	0	2	0	0	1	0	0	1	0	7	3

City reports for week ended August 12, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	6
New Orleans	1	------	1	2	13	1	0	11	0	41	181
Shreveport	0	------	0	0	4	1	0	1	0	2	33
Oklahoma:											
Oklahoma City	0	------	0	2	3	1	0	0	0	0	38
Texas:											
Dallas	1	------	0	0	1	0	0	4	0	1	62
Forth Worth	0	------	0	0	4	1	0	2	2	2	87
Galveston	0	------	0	0	0	0	0	0	0	0	13
Houston	0	------	0	0	1	0	0	12	3	0	74
San Antonio	0	------	1	1	6	0	0	5	0	0	48
Montana:											
Billings	0	------	0	0	0	0	0	0	0	2	5
Great Falls	0	------	0	2	0	0	0	0	0	0	8
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	0	1	0	0	0	0	0	4
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	11
Colorado:											
Colorado Springs	0	------	0	0	1	2	0	0	0	1	10
Denver	6	------	0	2	3	7	0	1	0	9	78
Pueblo	0	------	0	0	1	0	0	0	0	7	9
New Mexico:											
Albuquerque	0	------	0	0	0	1	0	1	0	0	9
Utah:											
Salt Lake City	0	------	0	5	0	0	0	0	0	19	26
Washington:											
Seattle	1	------	0	22	1	0	0	4	0	3	75
Spokane	0	------	0	3	0	3	0	0	0	0	25
Tacoma	0	------	0	11	0	0	0	1	0	0	23
Oregon:											
Portland	0	------	0	4	0	0	0	1	1	0	79
Salem	0	------	------	1	------	0	0	------	0	0	------
California:											
Los Angeles	8	3	2	11	4	7	0	19	0	8	298
Sacramento	0	------	0	2	0	1	0	2	1	2	31
San Francisco	1	------	0	3	2	2	0	2	0	4	148

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Vermont:			
Burlington	0	0	1
Massachusetts:			
Boston	0	0	2
Worcester	1	2	2
Rhode Island:			
Providence	0	0	1
New York:			
Buffalo	0	0	4
New York	1	2	6
New Jersey:			
Camden	0	0	4
Pennsylvania:			
Philadelphia	0	0	10
Pittsburgh	0	0	4
Ohio:			
Cleveland	0	0	2
Illinois:			
Chicago	0	0	2
Michigan:			
Detroit	0	0	65
Flint	0	0	1
Wisconsin:			
Milwaukee	0	0	2

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Minnesota:			
Minneapolis	0	0	5
St. Paul	0	0	2
North Dakota:			
Fargo	0	0	1
Nebraska:			
Omaha	0	0	2
Maryland:			
Baltimore	1	0	0
South Carolina:			
Charleston	0	0	4
Kentucky:			
Lexington	0	0	1
Alabama:			
Birmingham	1	0	0
Texas:			
San Antonio	0	0	1
Colorado:			
Denver	0	0	2
Oregon:			
Portland	1	0	0
California:			
Los Angeles	0	0	14

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Scranton, 1.

Pellagra.—Cases: Boston, 1; Atlanta, 1; Savannah, 5; Tampa, 1; Montgomery, 1; New Orleans, 1; Dallas, 1.

Typhus fever.—Cases: New York, 1; Washington, 1; Charleston, S. C., 1; Greenville, 1; Tampa, 1; Montgomery, 2; Lake Charles, 1; Shreveport, 1; Dallas, 1; Fort Worth, 1; Houston, 1; San Antonio, 2. Death: San Antonio, 1.

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended July 1, 1939.—During the 4 weeks ended July 1, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	11	8	Scarlet fever	2	
Malaria	10	3	Tuberculosis		2
Poliomyelitis	2	1	Typhoid fever	19	

ITALY

Communicable diseases—4 weeks ended May 21, 1939.—During the 4 weeks ended May 21, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	Apr. 24-30	May 1-7	May 8-14	May 15-21
Anthrax	2	13	12	10
Cerebrospinal meningitis	36	44	32	29
Chickenpox	620	550	588	529
Diphtheria	494	443	369	419
Dysentery (amoebic)	19	5	15	26
Dysentery (bacillary)	3	1	2	4
Hookworm disease	29	64	45	54
Lethargic encephalitis		2	1	
Measles	2,086	2,021	2,123	2,054
Mumps	289	313	264	307
Paratyphoid fever	47	46	48	58
Pellagra	93	26	24	22
Poliomyelitis	32	38	41	74
Puerperal fever	21	25	21	25
Rabies			1	
Scarlet fever	293	289	247	284
Typhoid fever	254	212	242	252
Undulant fever	157	133	159	167
Whooping cough	586	537	590	413

JAMAICA

Communicable diseases—4 weeks ended August 5, 1939.—During the 4 weeks ended August 5, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Leprosy		3
Chickenpox	10	18	Puerperal sepsis		2
Diphtheria	11	10	Scarlet fever		1
Dysentery	5	5	Tuberculosis	24	62
Erysipelas		2	Typhoid fever	6	48

PANAMA CANAL ZONE

Notifiable diseases—April–June 1939.—During the months of April, May, and June 1939, certain notifiable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	April		May		June	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	36		13		16	
Diphtheria	2		16	1	7	
Dysentery (amoebic)	6	3	10		10	
Dysentery (bacillary)	5	1	5	1	6	2
Leprosy	1		1		3	
Malaria	29	1	32	1	150	6
Measles	7		7		3	
Meningococcus meningitis		3	1	1		
Mumps	2		2		1	
Paratyphoid fever					2	
Pneumonia		20		22		17
Relapsing fever					1	
Tuberculosis		26		36		32
Typhoid fever	4		1		2	1
Typhus fever			1			1
Whooping cough	[1] 2					

[1] In the Canal Zone only.

SWITZERLAND

Communicable diseases—May 1939.—During the month of May 1939, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	5	Poliomyelitis	2
Chickenpox	127	Scarlet fever	398
Diphtheria	78	Trachoma	1
German measles	17	Tuberculosis	301
Influenza	46	Typhoid fever	3
Measles	30	Undulant fever	12
Mumps	89	Whooping cough	187
Paratyphoid fever	8		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of August 25, 1939 pages 1573–1585. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month

Plague

Java—Batavia Residency.—An outbreak of pneumonic plague appeared in the Segalaherang District of the Batavia Residency, an inland region, in June 1939, according to recent information received from the American Consulate General at Batavia. Up to July 6 there had been 84 deaths, and on that date 16 known cases were present.

The case fatality rate in this outbreak is reported to be practically 100 percent.

A large number of deaths from plague are reported annually in Java, principally from the bubonic form, pneumonic plague being reported there only infrequently. The following mortality figures indicate that unusually high mortality appears in cycles:

Deaths from plague in Java

1925	14, 484	1932	6, 442	1936	6, 187
1929	4, 095	1933	16, 881	1937	3, 834
1930	3, 980	1934	23, 239	1938	2, 107
1931	4, 539	1935	12, 995		

The decrease shown in mortality from plague since 1935 is attributed to the adoption of antiplague vaccination, by the Otten method, the vaccination material being supplied by the Pasteur Institute of Java.

It was stated that plague has been endemic in Java since it was introduced from abroad about 40 years ago, and later spread from the ports to the interior. It has been successfully controlled in the coastal towns, where preventive measures can easily be applied, but persists in endemic form in certain interior foci where control is more difficult, principally in the Preanger Regencies, toward the south coast, in the north coast of the Pekalongan Residency, on the eastern slope of Mount Slamet, the south slope of Mount Prahu in middle Java, and in a small area south of Surabaya.

The Division of Plague Prevention of the Java Health Service is reported to have instituted intensive preventive measures to control the present epidemic.

Peru—Lima Department.—During the month of July 1939, 7 cases of plague with 2 deaths were reported in Lima Department, Peru.

Smallpox

Dominican Republic.—During the week ended August 5, 1939, 1 case of smallpox was reported in the Dominican Republic.

Yellow Fever

Brazil—Para State—Capanema.—On July 7, 1939, 1 death from yellow fever was reported in Capanema, Para State, Brazil.

Colombia—Department of Antioquia—Caracoli.—Between May and July 1939, four fatal cases of yellow fever (jungle type) were reported in the rural district back of Caracoli, not far from Cabanas, in the Department of Antioquia, along the Puerto Berrío-Medellin line of the Antioquian Railway. Cabanas is situated 25 miles southwest of Puerto Berrío, the terminal of the Antioquian Railway on the Magdalena River, approximately 447 miles from Barranquilla.

Although yellow fever cases are reported to have occurred from 1925 to 1938 in the Departments of Santander and Boyaca, on the east side of the Magdalena River, these four cases are stated to be the first reported from the west side of the river.

Nigeria—Yola.—On August 1, 1939, 1 fatal case of suspected yellow fever was reported in Yola, Nigeria.

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Public Health Reports

VOLUME 54 SEPTEMBER 8, 1939 NUMBER 36

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

During the week ended September 2, 479 cases of poliomyelitis were reported in the United States, as compared with 391 cases during the preceding week and a median of 333 cases for the corresponding week of the years 1934–38. The incidence during the current week was over 40 percent in excess of the median for the preceding 5 years.

Michigan reported 109 cases (with 51 in Detroit), as compared with 115 during the preceding week. Other States reporting a high incidence of the disease were: New York, 100 cases (of which 47 were reported in Buffalo and 20 in New York City); Minnesota, 60 (with 15 cases in Minneapolis); California, 50 (with 20 cases in Los Angeles); Pennsylvania, 44 (of which 15 cases were reported in Philadelphia); Ohio, 11 cases. The number of cases reported in New Jersey dropped to 10, in Illinois to 9, in Texas to 8, and in South Carolina to 6.

DENTAL PROGRAMS SPONSORED BY HEALTH AGENCIES IN 94 SELECTED COUNTIES*

By JOSEPH W. MOUNTIN, *Senior Surgeon*, and EVELYN FLOOK, *United States Public Health Service*

Because of the growing interest in dental programs as a part of public health work, advantage was taken of the opportunities afforded by the Health Facilities Study of the National Health Inventory for determining the extent to which such programs are sponsored by 1,861 health agencies in 94 selected counties. In the present report, as in previous ones of the series,[1] caution should again be urged against

*From the Division of Public Health Methods, National Institute of Health. Study conducted in connection with the National Health Inventory.

[1] Articles of this series already published are:

(*a*) Mountin, Joseph W.: How expenditures for selected public health services are apportioned. Pub. Health Rep., **52**: 1384 (October 1, 1937).

(*b*) Mountin, Joseph W., Borowski, Anthony J., and O'Hara, Hazel. Variations in the form and services of public health organizations. Pub. Health Rep., **53**: 523 (April 8, 1938).

(*c*) Borowski, Anthony J.: Positions and rates of pay in public health agencies. Am. J. Pub. Health, **28**: 1197 (October 1938).

(*d*) Borowski, Anthony J., and Plumley, Margaret Lovell: Preventive clinic facilities available in 94 selected counties of the United States. Pub. Health Rep., **54**: 335 (March 3, 1939).

(*e*) Mountin, Joseph W., and Flook, Evelyn: Organized public nursing and variation of field programs in 94 selected counties. Pub. Health Rep., **54**: 815 (May 19, 1939)

assuming that the aggregate figures presented here are representative of the entire United States, for, as explained in the earlier articles, the counties studied are disproportionately urban and include most of the large cities of the country. As a result, health services of all types are probably much better developed in the study areas than in the Nation as a whole. Despite this selective factor, it is possible to contrast conditions existing in the rural counties surveyed with those found in the populous districts, and to apply the findings to other areas of corresponding characteristics.

For purposes of the present report, measurement of dental service is based upon the volume of examinations, cleanings, fillings, extractions, gum and root canal treatments, bridge work, and orthodontia reported by the various health organizations. Reports from the agencies made no distinction between the work performed by dentists and that done by dental hygienists. Therefore, services of the latter must be considered as cooperative rather than as isolated contributions to the programs concerned. In 22 of the 94 counties studied, or approximately 23 percent, there is no definite provision for public dental service through health agencies. Areas without dental programs are largely rural, since 18 of the 22 counties referred to have less than 40,000 inhabitants. In only 1 county without dental service sponsored by public health agencies does the population exceed 100,000. That dental service is omitted from the public health activities of 18 counties of the lowest population group becomes increasingly significant when it is realized that these 18 jurisdictions represent more than half of the 32 counties of this size category included in the study. However, for the purpose of showing the extent to which dental care is supplied through health agencies for people living in areas having different characteristics, the population of counties without as well as of those with programs for such work is included in all calculations.

Of the 1,861 health organizations which filed reports, 390 furnish some form of dental service to the public. Distribution of these agencies by type of control shows that 100 of them are health departments, 169 are designated as other official agencies, chiefly health divisions in the departments of education and welfare, and 121 are classified as nonofficial or voluntary health agencies. The latter group is composed of such organizations as visiting nurse associations, maternal and child welfare societies, tuberculosis associations, the American Red Cross, and similar bodies having special health interests.

Borowski,[7] in his study of health agency personnel, states that 390 health agencies sponsoring dental programs employ a total of 818 dentists, but that only 136 of this number devote all of their time to public service. All others are employed on a part-time basis. It should be added that the aforementioned dental staff is supplemented

[7] See footnote 1 (c).

by 220 dental hygienists, 169 of whom serve full time (table 1). Consequently, the services analyzed in this report represent the work of 1,038 professional and technical persons; however, less than one-third of this number contribute all of their time to the programs under discussion.

TABLE 1.—*Number of health agencies which sponsor dental programs, and number of full- and part-time dental personnel employed by agencies of each type*

Type of agency	Agencies of each type which sponsor dental programs	Dental personnel employed by agencies of each type					
		Total dental personnel		Dentists		Dental hygienists	
		Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
All types	390	305	733	136	682	169	51
Health departments	100	161	148	76	140	85	8
Other official agencies	169	75	144	16	122	59	22
Nonofficial agencies	121	69	441	44	420	25	21

Since the majority of dental personnel serve only part time, and since part-time employment is so variable as to compensation and service requirements, the number of personnel employed is perhaps a less satisfactory criterion for judging the comparative emphasis which agencies of different types place upon dental activities than is the amount of money allotted by each to dental programs. According to an earlier study made by one of the authors (Mountin),[3] 2 percent of the total budget of health agencies in the 94 counties studied is assigned to dentists' salaries. When funds expended for the remuneration of dental hygienists are added, the proportion is increased to 2.8 percent of all expenditures for items of service designated as public health work. Notwithstanding the fact that this is a relatively low percentage when compared with the salary budgets for other types of health agency personnel, the sum allocated for payment of dental workers amounts to the appreciable figure of more than $800,000. Health departments spend approximately two-fifths of this, other official agencies nearly one-third, and voluntary health organizations about one-fourth. It is recognized, of course, that additional funds not determined here are expended by all types of health organizations for dental materials and equipment.

In the report previously referred to,[3] it is shown that the proportion of the total health outlay which is set aside for dental work varies according to the type of agency. Although health departments rank first in aggregate expenditures for dental salaries, other official agencies devote relatively more of their total health budgets to this purpose than do health organizations of any type considered. This difference

[3] See footnote 1 (*a*).

is probably a reflection of dissimilarity in the major interests of the several classes of agencies. Activities of health departments cover a much wider range than do those of health units in departments of education; consequently, within the programs of health departments dental service is given relatively less emphasis than within those of other official health groups. Furthermore, health units of school boards are primarily concerned with the well-being of school children, and it is this segment of the population which receives most of the dental service rendered by the agencies studied. Among the group of nonofficial agencies, home nursing overshadows any other item of service, particularly dental care.

Inasmuch as preliminary inspection of the reports submitted revealed that, almost without exception, the dental service provided was predominantly for school children (only 2 percent of all persons served were adults), all analyses herein reported are restricted to service for the group receiving primary consideration. Some idea of the extent to which dental service is furnished school children[4] living in counties of different population categories may be gained by referring to table 2. This tabulation presents an over-all picture of the dental work reported for the school population involved. Examinations, cleanings, fillings, extractions, and unclassified services designated as "other" are given equal weight in this enumeration of total dental activity. It is immediately apparent that urbanization is a primary factor in determining the amount of dental service received. As the population level rises, there is a steady increase in the proportionate number of dental services reported. Relatively three times as many services were rendered in counties having populations exceeding 500,000 as in those with less than 40,000 inhabitants.

TABLE 2.—*Number of dental services per 1,000 school population*[1] *reported by specified types of health agencies in counties of different population classes*

Population classification of county	Number of counties of each population class	Total school population in counties of each population class	Dental services per 1,000 school population reported by specified type of agency			
			All agencies	Health departments	Other official agencies	Nonofficial agencies
All counties studied	94	5,935,558	817	411	196	210
Under 40,000	32	133,135	293	170	78	45
40,000–99,999	22	284,723	430	122	255	53
100,000–499,999	26	1,305,574	683	166	400	117
500,000 and over	14	4,212,126	901	515	132	254

[1] See text, footnote 4.

[4] Fifteenth Census of the United States, 1930 Population, vol. III, table 11, Children 5–14 years of age. U. S. Bureau of the Census. For the purposes of this study, school population is considered to be the equivalent of children 6–15 years of age The 1930 Census enumeration of children 5–14 has been used as the best available estimate of children within this age group.

From the standpoint of all study counties considered as a group, health departments performed as many services as did official and nonofficial agencies combined. This performance becomes even more significant when it is recalled that dental service is one of the less prominent features of health department activity. The outstanding position of health departments in this regard is accentuated in counties of the smallest and in those of the largest population categories. In counties of the two intermediate population brackets, however, other official health agencies exceed health departments in the volume of dental services reported. This variation among localities of different sizes with respect to the kind of agencies providing the most dental work is, in all probability, caused by a difference in the general organization of their entire health programs. Whereas in some communities, particularly in large cities, tax-supported health services tend to be centralized under health department administration, in many less populous jurisdictions certain elements of the program are delegated to associated agencies; hence, the performance of the latter group is elevated, and the volume rendered by health departments is, on a relative basis, reduced. Nonofficial agencies function primarily in urban localities; therefore, it is not surprising to find that children living in counties of less than 100,000 population receive relatively little dental service from these organizations. Only in counties of 500,000 or more population do nonofficial agencies emerge from the lowest rank as sponsors of public dental service. In these urban counties voluntary agencies surpass official agencies other than health departments with respect to this item. However, even in the most populous counties, the volume of service reported by nonofficial agencies is only about half that performed by dental employees of health departments.

The foregoing presentation of the dental activity of health agencies affords a general view of the volume of service rendered by different types of agencies in communities of varying size. More detailed analysis is necessary, however, if the true nature of such service is to be understood. The figures presented in table 3 are a result of further study of the situation. From the standpoint of all services enumerated for the entire group of counties studied, examinations alone account for more than two-fifths of the total volume of dental work. It is apparent that relatively little time is given to oral hygiene, since prophylaxis is the type of service least frequently reported. On the other hand, for every extraction made, approximately two fillings were placed. X-ray, gum and root canal treatments, bridge work, othodontia, and other miscellaneous services comprise one-tenth of all services.

The expression of dental activity in terms of the relative emphasis placed upon each type of service gives some conception of the general

pattern of dental care as rendered by health agencies. Evaluation of the extent to which health agencies contribute to the solution of the entire problem is facilitated when the dental performance of these groups is related to, first, the total dental needs of school children, and, second, all dental services received by corresponding population groups.

TABLE 3.—*Percentage distribution of dental services reported by health agencies operating in counties of different population classes, according to the kind of service rendered*

Population classification of county	Total number of dental services reported	Percent of services which were of each type				
		Examinations	Prophylaxis	Fillings	Extractions	Other
All counties studied	4,849,681	42.8	7.1	25.9	13.5	10.7
Under 40,000	38,982	60.7	4.4	29.6	4.6	.7
40,000–99,999	122,330	64.6	14.5	8.9	11.9	.1
100,000–499,999	891,954	50.9	7.7	19.3	14.1	8.0
500,000 and over	3,796,415	40.0	6.7	27.9	13.6	11.8

A survey of the current dental needs and past dental treatment of school children in 26 States made in 1933–34[5] included 26 of the counties subsequently covered by the Health Facilities Study. Therefore, the data given in this survey of current dental needs were used as an index for determining the approximate contribution to dental care made by health agencies. According to the findings reported in the above survey,[5] about two-thirds of the children examined in these overlapping study areas required dental prophylaxis, and a child representing the average needed 1.1 teeth (permanent and deciduous) extracted. Comparisons based upon the needs reported in the reference under citation and the services rendered by health agencies operating in identical districts reveal that facilities of public health agencies meet about 10 percent of the need for prophylaxis and 15 percent of the need for extractions.

The report of the 1933–34 survey does not provide tabulations of defective tooth surfaces per child which require fillings, but Klein, Palmer, and Knutson,[6] in a study of 4,416 grade school children in Hagerstown, Md., found for that particular city that the average child had 7.5 carious tooth surfaces (deciduous and permanent) requiring fillings. If this average is applied to the combined population of the 94 counties studied and related to the performance of health agencies, the resulting calculation suggests that such agencies place only about 3 percent of the estimated number of fillings required.

[5] Messner, C. T., Gafafer, W. M., Cady, F. C., and Dean, H. T.: Dental Survey of School Children, Ages 6–14 Years, Made in 1933–34 in 26 States. Public Health Bulletin No. 226 (May 1936). U. S. Government Printing Office, Washington, D. C.

[6] Klein, Henry, Palmer, Carroll E., and Knutson, John W.: Studies on dental caries. I. Dental status and dental needs of elementary school children. Pub. Health Rep., 53: 751 (May 13, 1938).

It cannot be assumed that all additional dental needs are adequately met through private facilities. As a matter of fact, recent information on the subject reveals a large unmet need. Collins,[7] in a report on dental services received by 9,000 white families during a 12-month period, suggests that the number of annual dental services from all sources reported for children 6–15 years of age averages 110 prophylaxis treatments, 524 fillings, and 221 extractions per 1,000 children. On a basis of the estimated dental needs for children of similar age groups,[8] it appears that public and private facilities combined provide only one-sixth of the indicated prophylaxis, one-fifth of the necessary extractions, and 7 percent of the required fillings. While the service described meets only a small part of the need, public health agencies make a significant contribution. Of the work done to meet this need, such organizations render service equivalent to 52 percent of the prophylaxis, 40 percent of the fillings, and 50 percent of the extractions.

By comparing the ratio of service to need in the three categories (prophylaxis, fillings, and extractions), it would appear that, in the dental programs of health agencies, preventive and corrective activities are subordinate to work which might be termed "emergency," even though the total volume of extractions is only half as great as the number of fillings placed. It might be explained, in extenuation of such procedure, that most of the dental service reported is performed for an age group wherein a high proportion of the extractions represents removal of deciduous teeth. However, it is encouraging to note that in some communities there is a tendency to sponsor preventive and corrective dental programs. The gross total of prophylaxis and fillings reported bears evidence of this.

Generally speaking, dental service, like all other types of public health activity, tends to be of a more diversified character in populous communities than in rural areas (table 3). Whereas examinations constitute 60 percent of the dental service received by children residing in counties of less than 40,000 inhabitants, and fillings represent the only other service reported in any significant amount, in counties having 500,000 or more persons only 40 percent of all services recorded were classified as examinations, while extractions and miscellaneous services, as well as fillings, were provided with a moderate degree of frequency. The fact that comparatively few fillings were placed in the two intermediate groups of counties is probably a reflection of the general policy of other official agencies which predominate as dispensers of school dental service in areas of this size. As will be emphasized later, these agencies do not specialize in corrective work.

[7] Collins, Selwyn D.: Frequency of dental services among 9,000 families, based on Nation-wide periodic canvasses, 1928-31. Pub. Health Rep., 54: 629 (April 21, 1939).

[8] See footnotes 5 and 6.

That urbanization of an area influences the distribution of public dental care therein is confirmed by the variation between counties of different population categories with regard to the proportion of estimated need taken care of through health agencies.

The type of dental service featured is largely dependent upon the agency sponsoring the program. Table 4 indicates that health departments not only render a greater volume of dental service than do agencies of any other type, but that they also provide a greater variety of service. Agencies of this class are unique in that they are characterized by a higher number of fillings than of examinations. Health departments also place a certain amount of emphasis upon extractions and miscellaneous services designated as "other." In general, the pattern of dental service rendered by nonofficial agencies conforms closely to that described for health departments. The most noticeable variation lies in the tendency of nonofficial agencies to limit miscellaneous care. At the same time, other official agencies are apt to restrict their dental activities to examinations only; nearly three-fourths of all services reported were so classified. The fact that health units controlled by school authorities provide relatively little actual dental care in the form of fillings suggests that these organizations sponsor programs which are largely informational in character. Parents are notified of dental defects found upon examination, and the responsibility of correction rests with the family. It would appear, therefore, that two factors contribute toward the variation in dental service available to residents of different types of communities, first, urbanization, as expressed by county population, and, second, the type of health agency most active in the area.

TABLE 4.—*Percentage distribution of dental services reported by health agencies of specified type, according to the kind of service rendered*

Type of health agency	Total number of dental services reported	Percent of services which were of each type				
		Examinations	Prophylaxis	Fillings	Extractions	Other
All agencies	4,849,681	42.8	7.1	25.9	13.5	10.7
Health departments	2,441,244	30.5	7.8	30.8	15.1	15.8
Other official agencies	1,163,531	72.6	7.2	9.5	7.0	3.7
Nonofficial agencies	1,244,906	39.0	5.5	31.5	16.6	7.4

Up to this point in the present paper all analyses of dental programs have been made on the basis of activity as expressed in services rendered, rather than from the standpoint of the proportion of all school children who were recipients of the various forms of dental service. The number of children benefited by dental projects of health agencies is no less important than the volume and kinds of service rendered, and parallelism between the two cannot be assumed to exist. For instance, it is the policy of some organizations to

examine every school child in the jurisdiction, and then to notify the parents of each defect found. Remedial work, in a system of this kind, depends upon the financial ability and interest of the parents, although some dental corrections might be made for extremely indigent children. Under such circumstances the proportion of the school population examined would be high, whereas the proportion receiving other types of service would be exceedingly low. Other agencies might charge a nominal fee for each service rendered. The percentage of children served would then depend upon the number presenting the fee required. Still another scheme is that of concentrating service by examining only children in particular school grades and then making all corrections indicated. It is evident that such procedure would result in examinations for relatively few, but in more thorough care for a proportionately large number.

These, and many other individual policies, help to determine the final fact that approximately one-third of the entire school population of the 94 surveyed counties received a dental examination during the 1-year period under consideration. Of those examined, not more than 29 percent were given any type of preventive or corrective dental care. More children had fillings than extractions, and there was a wider spread of both of these services than of prophylaxis or such care referred to as "other."

When, earlier in this report, the aggregate volume of recorded dental service was related to population characteristics of the surveyed counties, it was suggested that urbanization of an area fosters development of public dental programs for school children. Figures which are based on the proportion of all children served, and which are presented in table 5, substantiate this relationship. Moreover, they further reveal that services are distributed in such a manner that children of urban counties are assured a better chance of receiving all kinds of dental services than are those of rural areas. In counties with more than 100,000 inhabitants nearly twice as many children per population unit were given dental examinations as in counties with less than 40,000 population.

Differences are even more exaggerated when actual care is involved. Two examples might be cited. The proportion of all children who received fillings increases steadily as the population level rises; indeed, relatively four times as many children in counties of the highest population bracket as in areas with fewest inhabitants were recipients of such service. The comparative number for whom extractions were made likewise rises in accordance with greater urbanization. In counties with over 500,000 inhabitants, extractions were recorded for proportionately ten times as many children as in areas of the lowest population category.

TABLE 5.—*Number of children per 1,000 school population [1] who received selected kinds of dental service from health agencies operating in counties of different population classes*

Population classification of county	Total school population in counties of each population class	Children per 1,000 school population who received selected kinds of dental service				
		Examinations	Prophylaxis	Fillings	Extractions	Other
All counties studied	5,935,558	323	56	94	83	47
Under 40,000	133,135	178	12	25	9	2
40,000-99,999	284,723	277	62	31	41	(2)
100,000-499,999	1,305,574	342	50	68	57	29
500,000 and over	4,212,126	324	58	108	96	57

[1] See text, footnote 4.
[2] Less than 0.5 of 1 child per 1,000 school population

Table 6 shows that official agencies other than health departments were responsible for examination of the greatest number of children; health departments and nonofficial agencies follow in the order named. At first glance, this statement appears to contradict findings already reported, for, it will be remembered, health departments performed over half of the entire volume of service reported. More careful study of table 6 reveals, however, that other official agencies supersede health departments only in the instance of children examined, and even then the difference is relatively slight. Insofar as actual treatment or care is concerned, health departments served more children than all other agencies combined, irrespective of whether the criterion of comparison is prophylaxis, fillings, extractions, or miscellaneous services. These findings indicate that the dental programs of health departments are wider in scope than are those of other official agencies, and that the health department policy benefits more children than does the plan pursued by health units under the control of other governmental bodies. As a matter of fact, more children were given fillings and extractions by dental personnel of nonofficial health organizations than by those connected with official agencies other than health departments.

TABLE 6.—*Number of children per 1,000 school population [1] who received selected kinds of dental service from specified types of health agencies*

Type of health agency	Children per 1,000 school population who received selected kinds of dental service				
	Examinations	Prophylaxis	Fillings	Extractions	Other
All agencies	323	56	94	83	47
Health departments	118	32	58	54	35
Other official agencies	125	13	13	11	4
Nonofficial agencies	80	11	23	18	8

[1] See text, footnote 4.

SUMMARY

In slightly over three-fourths of the 94 counties surveyed for purposes of the Health Facilities Study of the National Health Inventory, some sort of public dental program is sponsored by one or more official or nonofficial health agencies. Counties without any definite dental program are largely rural. Agencies supplying dental service in the 72 counties number 390; of these, 100 are health departments, 169 are other official agencies, and 121 are voluntary health organizations. Both dentists and dental hygienists contribute to the service rendered. Great variation characterizes programs sponsored by different health agencies. Some organizations provide only examination, while others perform some of the corrective work indicated. Health units in the departments of education allocate a larger proportion of their total health budget to dental service than do either health departments or nonofficial agencies.

During the period of 1 year covered by this study a total of nearly 5 million individual dental services was rendered to school children in the surveyed areas. This aggregate volume includes examinations, prophylaxis, fillings, extractions, and a scattered number of orthodontic, gum, and root-canal treatments. It is estimated that health agencies provide between two-fifths and one-half of all dental services received by children of school age, but that this record of service represents only a small fraction of the total need for dental care. Public health organizations do proportionately more toward meeting the need for extractions than for fillings or prophylaxis. Consequently, their programs might be described as being of an emergency nature rather than as corrective or preventive in character. Urbanization of an area fosters development of dental activities, for relatively three times as many services were rendered in counties with 500,000 or more inhabitants as in localities having less than 40,000 population. Likewise, a higher proportion of estimated need is met in populous counties than in those which are sparsely settled.

More dental service was reported by health departments than by all other official agencies and nonofficial agencies combined. Furthermore, health departments offer a greater variety of service; 70 percent of their performance was preventive or remedial in character, whereas this type of work constituted only a little over one-fourth of the services rendered by other official groups. Dental programs of nonofficial health organizations provide for somewhat more diversified services than do those of other official agencies, but are less varied than the dental projects of health departments.

Association of reported services with proportion of the total school population who received the various kinds of dental attention leads to the conclusion that official agencies other than the health department

are responsible for the examination of relatively more children than are health agencies of any other type. At the same time, proportionately more children were given actual care by the dental personnel of health departments than by corresponding workers either of other official or of voluntary agencies. Of the two latter classes, nonofficial organizations provided treatment for more children than did health units controlled by school authorities. The number of children per population unit who received any type of dental service considered is larger for densely populated counties than for rural communities.

THE SOLUBILITY OF LEAD ARSENATE IN BODY FLUIDS

By Lawrence T. Fairhall, *Principal Industrial Toxicologist, United States Public Health Service*

The widespread use of lead arsenate as an insecticide has encouraged further study of certain of its properties. Exposure to lead arsenate varies in form from the inhalation of lead arsenate dust by workers in plants engaged in the manufacture of lead arsenate insecticide (*1*) or in the spraying of fruit trees, to the ingestion of lead arsenate by the consumer of sprayed foodstuffs. The type of lead arsenate of greatest commercial importance is the dilead orthoarsenate $PbHAsO_4$. Little has been known with regard to what occurs after the arsenate enters the human body. In spite of its insolubility in water, it does not pass through the alimentary canal unchanged, but, as has been recently shown (*2*), is more or less completely broken down in the body, since for the most part the arsenic is excreted by the kidneys and the lead through the gastrointestinal tract. The inhaled lead arsenate carried into the lungs and deposited there is exposed to a different sort of solvent action from that in the alimentary tract. The arsenate deposited in the lungs comes into contact with tissue fluid, which is probably best approximated in composition by blood serum. Furthermore, it has recently been shown (*3*) that, while the intraperitoneal injection of lead or its ordinary compounds is not immediately attended by any serious consequences, lead arsenate so injected produces a marked toxic effect. The following investigation was concerned with the determination of the solvent action of certain fluid media with which the arsenate comes into contact in the body through inhalation or ingestion.

EXPERIMENTAL PROCEDURE

The initial experiments consisted in shaking an excess of the solid lead arsenate with the solvent in bottles in a thermostat at 25° C. The equilibrium mixture, after settling, was filtered in a Zsigmondy

membrane high-pressure ultrafilter, using two No. 600 cellophane disks which gave a filtrate practically protein free. The filtrates were analyzed for arsenic and for lead.

It was soon apparent that, while the filtrates from lead arsenate-water mixtures contained only traces of either arsenic or lead, the serum-lead arsenate filtrates contained a considerable amount of arsenic, while the amount of soluble lead did not differ greatly from those cases where water alone was used as solvent. Furthermore, it was found that the amount of soluble arsenic differed with different amounts of lead arsenate (solid). It reached a maximum with increasing amounts of the latter and then diminished. Therefore, it was apparent that, while lead arsenate itself is very slightly soluble, the arsenic undergoes change in contact with serum.

When serum was added to water in increasing amount with a fixed amount of solid lead arsenate, an increasing quantity of arsenic dissolved, reaching a maximum with a 100-percent serum-lead arsenate mixture. An artificial serum containing the salts of normal serum and egg albumin gave results similar to those of normal serum, although somewhat lower. Finally, isotonic sodium chloride solution also gave filtrates containing soluble arsenic.

These results show that a transformation occurs, the soluble arsenic being split off while the lead portion of the molecule is not affected. The simplest explanation of this change is that serum and similarly allied media promote the transformation of dilead orthoarsenate to trilead orthoarsenate, as follows:

$$3\ PbH\ (AsO_4) \rightleftharpoons Pb_3(AsO_4)_2 + H_3AsO_4.$$

McDonnell and Graham (*4*), however, found that dilead arsenate is slowly decomposed by water (over a period of months), with the formation of a basic lead arsenate (hydroxymimetite), $Pb_4(PbOH)(AsO_4)_3.H_2O$, and free arsenic acid.

The results obtained with water alone in this investigation agree with the results obtained by McDonnell and Graham. A mixture of an excess of dilead arsenate shaken with water showed a very slow liberation of arsenic acid as follows:

Time	*Arsenic (gram per liter)*
10 days	0.0067
49 days	.0068
348 days	.035

With serum or with sodium chloride, decomposition proceeds much more rapidly, so that the chemical change is completed in a few days. When serum was shaken for several months with dilead arsenate, no further change was apparent than had occurred in a shorter period of time (table 1).

TABLE 1.—*Solvent effect of serum upon lead arsenate*

Time	Lead arsenate (solid) (grams)	Serum (cc.)	Soluble arsenic (grams As/liter at 25° C.)
2 hours	3	200	0.059
4 days	3	200	.458
48 days	3	200	1.02
54 days	3	200	1.08
55 days	3	200	.99

The addition of serum to distilled water in increasing amounts showed that the amount of soluble arsenic split off is proportional to the amount of serum present. When 1-gram amounts of solid lead arsenate were shaken for 10 days with 200 cc. of serum-water mixtures at 25° C. increasing amounts of dissolved arsenate were found (table 2).

TABLE 2.—*Solvent effect of serum-water mixtures upon lead arsenate*

Volume percent of serum	Lead dissolved (grams Pb/liter)	Soluble arsenic (grams As/liter)	Volume percent of serum	Lead dissolved (grams Pb/liter)	Soluble arsenic (grams As/liter)
0	0.00006	0.0067	10.0	0.00007	0.200
0.5		.010	25.0	.00031	.242
1.0	.00051	.014	37.5	.00021	.304
2.5	.00014	.049	50.0	.00030	.418
5.0	.00002	.150			

Further experiments were made to determine whether the increased amount of dissolved arsenic was due to partial reduction to arsenite, but analyses of the filtrates showed only a negligible amount of arsenite to be present.

A study of other factors, such as protein content, slight shifts in hydrogen ion concentration, and variation in salt content, showed that sodium chloride solution had as pronounced a solvent action as serum. The amount of dissolved arsenate rose to a maximum with increasing amounts of solid lead arsenate and then markedly diminished (table 3). The mixtures in each case were shaken to equilibrium.

TABLE 3.—*Solvent effect of isotonic sodium chloride solution upon lead arsenate*

Isotonic sodium chloride (cc.)	Lead arsenate (solid) (grams)	Lead dissolved (grams Pb/liter)	Dissolved arsenate (grams As/liter)
200	0.1	0.0024	0.06
200	1.0	.0017	.47
200	5.0	.0023	1.02
200	7.0	.00[illegible]0	.64
200	10.0		.38
200	20.0	.0030	.11

While lead arsenate is not dissolved to a greater extent in isotonic sodium chloride solution than in serum, with increasing amounts of sodium chloride both the dissolved arsenic and dissolved lead are increased. In other words, in addition to the soluble arsenate split from the molecule of lead arsenate there is a pronounced solvent action upon the lead arsenate itself with an increasing concentration of sodium chloride, which is probably due to interionic action (table 4).

TABLE 4.—*The solvent effect of sodium chloride upon lead arsenate at 25° C.*

Sodium chloride concentration (percent)	Lead arsenate (solid) (grams)	Lead dissolved (grams Pb/liter)	Arsenate dissolved (grams As/liter)	Sodium chloride concentration (percent)	Lead arsenate (solid) (grams)	Lead dissolved (grams Pb/liter)	Arsenate dissolved (grams As/liter)
0	3	0.00088	0.0068	5	3	0.0266	0.04
1	3	.0068	1.06	10	3	.0414	1.43
2	3	.0104	1.74	25	3	.836	1.58

These results indicate that, while the amount of soluble arsenate split off remains at nearly a constant figure, there is a pronounced increase in the amount of lead in solution.

A somewhat similar, although less pronounced, effect is noted when dilead orthoarsenate is shaken with solutions of potassium nitrate. Values obtained in this case were as follows:

Potassium nitrate solution (percent)	*Dissolved lead (Grams Pb/liter of filtrate)*	*Dissolved arsenic (Grams As/liter of filtrate)*
1.25	0.0035	0.050
10.0	.0194	.060
25.0	.0393	.050

With increasing concentrations of potassium nitrate, an increasing amount of lead arsenate is dissolved, but the amount of dissolved arsenate is less than with sodium chloride. There is, therefore, less evidence of a chemical change than of solubility with potassium nitrate.

The effect of high concentrations of sodium chloride is of less interest, whether the effect is that of interionic action or not, than the splitting off of the soluble arsenate that occurs with either serum or isotonic sodium chloride solution alone. The fact that lead is not carried into solution proportionately to the arsenic in the latter case indicates that this is not true solution, but is evidence of the occurrence of a chemical reaction between the dilead arsenate and one of the constituents of the solution (sodium chloride). Verification of this was obtained by analysis of the solid phase after equilibrium was attained (table 5).

TABLE 5.—*Variation of the molecular ratio PbO/As_2O_5 with the composition of the equilibrium mixture*

Composition of the equilibrium mixture/100 cc.	Analysis of solid phase		Molecular ratio PbO/As_2O_5
	PbO (percent)	As_2O_5 (percent)	
ISOTONIC SODIUM CHLORIDE SOLUTION			
Isotonic NaCl: 1 gm. $PbHAsO_4$	74.93	23.39	3.20
Isotonic NaCl: 3 gm. $PbHAsO_4$	73.89	23.64	3.12
Isotonic NaCl: 5 gm. $PbHAsO_4$	69 47	28.08	2 47
Isotonic NaCl 7 gm. $PbHAsO_4$	66 99	30.60	2.19
Isotonic NaCl 10 gm. $PbHAsO_4$	65.61	30 55	2.14
Isotonic NaCl: 20 gm. $PbHAsO_4$	64.38	32.10	2.01
SERUM			
Serum: 1 gm. $PbHAsO_4$	[1] 72 65	21.75	3 34
Serum: 2 gm. $PbHAsO_4$	[1] 73 40	21.59	3 39
Serum: 3 gm. $PbHAsO_4$	68 99	21 64	3 18
Serum: 5 gm. $PbHAsO_4$	68 59	24 26	2 82
Serum: 10 gm. $PbHAsO_4$	66 10	27 27	2 42
Serum: 20 gm. $PbHAsO_4$	64.58	31.44	2 05
THEORETICAL COMPOSITION			
$PbHAsO_4$	64 38	33.12	1.94
$Pb_4(PbCl)(AsO_4)_3$	74.97	23.18	3 23

[1] Solid residues could not be freed from protein entirely.

It is apparent from these results that, while the molecular ratio of lead oxide to arsenic pentoxide approaches that of pure dilead orthoarsenate (1.94), with increasing quantities in the serum-arsenate or isotonic sodium chloride-arsenate mixture, as might be expected, the value of the ratio approaches a larger figure as the amount of solid phase becomes smaller. In other words, a small amount of dilead orthoarsenate is converted into another compound. This compound was found to have the crystalline structure and chemical composition of pentalead chlorarsenate, $Pb_4(PbCl)(AsO_4)_3$, first prepared by the wet method at ordinary temperatures by McDonnell and Smith (*5*).

Analysis of the solid phases when 1-gm. samples of dilead orthoarsenate were shaken with isotonic sodium chloride solution to equilibrium, as shown in table 5, gave a composition which compares favorably with that for pentalead chlorarsenate:

	Composition found (percent)	Theoretical composition of pentalead chlorarsenate $Pb_4(PbCl)(AsO_4)_3$ (percent)
PbO	74 93	74.97
As_2O_5	23.39	23.18
Cl	2 38	2.38
	100.70	100.53
O, equivalent to Cl	.53	.53
	100 17	100.00

In table 5 it will be noted that the molecular ratio PbO/As_2O_5 increases from its initial value of 1.94 as the amount of solid is diminished in the equilibrium mixture, both in the case of serum and of isotonic sodium chloride, and approaches the theoretical value (3.23) for pentalead chlorarsenate. The maximum molecular ratios with 1 gram samples in the two latter cases were 3.39 and 3.20, respectively. The value 3.39 is high, owing to analytical difficulties arising from the presence of protein. Numerous small crystals with parallel extinction and structurally resembling pentalead chlorarsenate were present in the residues.

It would appear from the foregoing experiments that dilead orthoarsenate in contact with body fluids of normal saline content is converted in the following manner:

$$5PbHAsO_4 + NaCl \rightleftharpoons Pb_4(PbCl)(AsO_4)_3 + NaH_2AsO_4 + H_3AsO_4$$

In other words, two-fifths of the arsenic acid is split from the molecule and remains in solution as soluble arsenate, leaving a residue of the insoluble chloro derivative.

The solubility of lead arsenate in other body fluids is more marked in the case of saliva and of gastric juice than in the case of bile (table 6). The latter did not tend to split off soluble arsenate to the extent that serum itself did. Saliva, however, appears to dissolve about five times as much lead arsenate as serum does. The solvent effect of gastric juice is more marked than that of any of the other media that were investigated. An artificial gastric juice prepared from freshly killed hog stomach digested with 0.4 percent of hydrochloric acid dissolved lead arsenate to the extent of 0.747 gram per liter at 25° C., while 0.4 percent of hydrochloric acid dissolved a maximum of 0.790 gram at the same temperature. These values compare favorably with results obtained by Carlson and Woelfel (*6*) with human gastric juice. Carlson's results, when recalculated in terms of solubility of lead arsenate per liter of solution at 38° C., give a value of 0.520 gram. The free acidity of the gastric juice in Carlson's experiments varied from 0.42 percent to 0.47 percent.

The results obtained with gastric juice differ from those obtained with serum in that lead arsenate tends to dissolve as an entity in the former, whereas with serum a portion (nearly one-third) of the arsenic passes into solution as soluble arsenates while the lead remains fixed in the insoluble complex pentalead chlorarsenate.

It may be because of this fixation of lead that workers inhaling lead arsenate spray and mist do not have the rapid absorption of lead that occurs following exposure to lead monoxide and lead carbonate. Certainly the incidence of lead poisoning among sprayers is not high.

TABLE 6.—*The solubility of dilead orthoarsenate in various media at 25° C.*

Medium	Dissolved arsenates (grams As_2O_5 per liter)	Solubility of $PbHAsO_4$ based upon the amount of dissolved lead (grams $PbHAsO_4$ per liter)
Water	0.0537	0.00022
Serum		
Human	.7025	.00072
Dog	.9586	.00050
Horse	.8436	.00034
Cow	.9847	.00034
Bile	.2569	.00042
Artificial serum	2.300	.00190
Saliva	.7290	.00246
Isotonic sodium chloride	1.733	.00450
Artificial gastric juice	.2653	.7470
0.4 percent hydrochloric acid	.6253	.790

The pronounced solubility of dilead orthoarsenate in gastric juice, on the other hand, is sufficient to account for the fact that ingested lead arsenate is so broken down that its components may be absorbed in passing through the gastrointestinal tract. The actual mechanism of absorption of the lead and arsenic components in the alimentary canal is a problem that still awaits solution.

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BREAST CANCER AND THE PEDIGREE RELATIONSHIP OF FOSTERED A STOCK MICE [1]

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The A strain of mice has been inbred since 1918 (Strong (*11*)) and representatives of the fifty-seventh generation have been obtained.

[1] This study was supported by a grant-in-aid from the National Cancer Institute.

The subline used in these investigations had a breast-tumor incidence of 83.6 percent in breeding females (11.1 months) and 4.9 percent in virgin females (18.5 months) (*6*). The numbers of mice observed were 1,093 and 223, respectively. Primary lung carcinoma developed in 89.2 percent of the virgin females, in 74.4 percent of the males used as breeders, and in 7.8 percent of the breeding females. Thus, the A stock breast or mammary cancer incidence is high in multiparous females and low in nonbreeding females.

In other publications we have reported on the decrease in the breast-tumor incidence in breeding females of the A stock by fostering the young the day of birth (within 24 hours) to low breast-tumor stock females (*1–4*, *7–10*). The data are tabulated in table 1. Ten fostered females, used as breeders, were observed to develop breast cancer in a group of 127 mice, or 7.9 percent. The average age at which the growths were recorded was similar to that of the control group. The progeny or descendants of the fostered mice which were nonbreast-cancerous numbered 525 and gave a breast-cancer ratio of 6.1 percent. Eighty-two of the progeny of fostered females which developed breast cancer were mated and they showed an incidence of 58.5 percent. The nonbreast-cancerous animals of each class lived, on an average, considerably longer than the control animals.

TABLE 1.—*Breast-cancer incidence in fostered A stock females, their progeny depending on the cause of death of the fostered females, and in the unfostered breeding and virgin females*

Class	Number of mice	Number with cancer	Percent with cancer	Average age (months)	
				Cancer	Noncancer
A. Fostered females	127	10	7.9	11.2	17.7
B. Progeny of noncancer fostered females	525	32	6.1	12.6	16.8
C. Progeny of cancer fostered females	82	48	58.5	11.8	17.2
D. Controls or unfostered females	1,093	914	83.6	11.1	12.5
E. Virgin females	223	11	4.9	18.5	19.2

The fostered young were permitted to nurse their A stock high tumor mothers a maximum of 24 hours before they were transferred. A few A stock young remained with their mothers for periods of 1 to 5 days before they were fostered. These data are shown in table 2. The incidence of breast tumors is comparable to that observed for the control stock.

In table 3 are listed, by litters, all the fostered females of which any of the progeny were mated. The cause of death and the age are indicated, and the number of the progeny or descendants, with their breast tumor ratios. Only 6 of the 10 fostered mice which developed mammary cancer are listed, as the others were members of litters from which no young were obtained.

TABLE 2.—*Breast-tumor incidence and average ages for A stock mice fostered the day of birth or from 1 to 5 days after birth by low tumor stock females*

	Number	Percent having cancer
Fostered day of birth	127	7.9
Average cancer age	11.2 months.	
Average noncancer age	17.7 months.	
Fostered after birth (days):		
1	3	100.0
2	7	71.4
3	2	100.0
4	0	----
5	3	100.0
Total	15	86.7
Average cancer age	9.8 months.	
Average noncancer age	15.2 months.	

TABLE 3.—*Fostered A stock females, by litters, with diagnosis, age at death, number of progeny and descendants, and the number and percentage which developed breast cancer*

[M. Gl.=mammary carcinoma; L. Tu.=lung carcinoma; N. T.=noncancerous; and N. A.=no autopsy for lung cancer]

Littor No.	Ledger No	Diagnosis	Age (days)	Progeny and descendants		
				Number of mice	Number with mammary carcinoma	Percent with mammary carcinoma
1	38430	N T	563	5	0	0
	38431	M Gl	356	40	21	52 5
	38432	L Tu	563	111	6	5.4
	38433	L Tu	384	8	4	50 0
2	38713	L. Tu	551	41	0	0
	38714	M. Gl	365	2	0	0
	38715	L. Tu	551	11	1	9.1
3	51232	N. T	583	0	----	----
	51233	N. T	195	9	0	0
	51234	N. T	544	0	----	----
	51235	M. Gl	216	0	----	----
4	51239	N A	344	0	----	----
	51241	M. Gl	383	33	21	63.6
	51242	L. Tu	483	0	----	----
	51243	L. Tu	579	0	----	----
	51244	N. T	579	0	----	----
	51245	L. Tu	579	0	----	----
	51246	N. T	532	3	0	0
5	51249	N. A	464	21	0	0
	51250	L. Tu	532	0	----	----
	51251	N. T	593	2	0	0
	51252	N. T	506	2	0	0
	51253	L. Tu	593	34	1	2.9
	51255	N. T	399	0	----	----
	51256	N. T	623	0	----	----
6	51259	L Tu	424	34	2	5.9
	51260	L. Tu	468	14	0	0
	51261	L. Tu	663	0	----	----
	51262	L. Tu	475	0	----	----
7	51267	L. Tu	475	5	0	0
	51268	L. Tu	585	14	1	7.1
	51269	N. T	597	1	0	0
	51270	L. Tu	585	24	0	0
	51271	L. Tu	585	4	0	0
	51272	L. Tu	502	0	----	----
8	51428	N. A	716	0	----	----
	51429	N. T	521	0	----	----
	51431	L. Tu	609	7	1	14 3

TABLE 3.—*Fostered A stock females, by litters, with diagnosis, age at death, number of progeny and descendants, and the number and percentage which developed breast cancer*—Continued

Litter No.	Ledger No.	Diagnosis	Age (days)	Progeny and descendants		
				Number of mice	Number with mammary carcinoma	Percent with mammary carcinoma
9	51456	N. T	433	0	-----	-----
	51457	N. T	432	0	-----	-----
	51458	N. T	577	2	0	0
	51459	L. Tu	551	2	0	0
	51460	N. T	433	0	-----	-----
	51461	N. T	384	1	0	0
	51462	N. T	383	4	1	25.0
10	51613	L. Tu	525	0	-----	-----
	51614	N. T	349	12	2	16.7
	51615	L. Tu	578	0	-----	-----
	51616	L. Tu	578	11	1	9.1
11	55871	N. A	402	8	0	0
	55872	N. A	661	1	0	0
	55873	L. Tu	612	0	-----	-----
	55874	N. A	402	5	0	0
	55875	N. A	402	3	0	0
12	56127	L. Tu	518	0	-----	-----
	56128	L. Tu	678	0	-----	-----
	56129	N. T	442	0	-----	-----
	56130	L. Tu	678	3	0	0
	56131	N. T	512	8	0	0
	56132	N. A	631	0	-----	-----
13	56282	N. A	371	0	-----	-----
	56283	N. A	590	1	0	0
	56284	N. T	352	0	-----	-----
	56285	L. Tu	362	0	-----	-----
	56286	L. Tu	391	8	1	12.5
14	56319	L. Tu	464	0	-----	-----
	56320	L. Tu	464	4	0	0
	56321	L. Tu	464	2	0	0
	56322	L. Tu	464	4	0	0
	56323	N. T	464	1	0	0
15	56398	N. A	440	1	0	0
	56399	M. Gl	293	0	-----	-----
	56401	M. Gl	447	1	0	0
	56402	N. T	447	8	5	62.5
	56403	L. Tu	428	10	6	60.0
16	56615	N. A	458	4	0	0
	56616	N. A	458	3	0	0
	56617	N. A	458	8	0	0
	56618	N. A	458	0	-----	-----
	56619	N. A	458	0	-----	-----
17	56623	L. Tu	662	0	-----	-----
	56624	N. A	662	3	0	0
	56625	L. Tu	662	2	0	0
	56626	N. A	367	0	-----	-----
	56627	L. Tu	587	3	0	0
18	56631	N. A	518	0	-----	-----
	56632	M. Gl	269	3	3	100.0
19	56637	N. A	653	0	-----	-----
	56638	N. T	498	4	0	0
20	56645	N. T	677	0	-----	-----
	56646	N. T	332	3	0	0
	56647	N. T	606	5	0	0
	56648	N. T	465	3	0	0
21	56652	N. A	500	5	0	0
	56653	N. A	573	0	-----	-----
22	57119	L. Tu	581	3	0	0
	57120	L. Tu	581	6	0	0
23	57124	L. Tu	555	4	0	0
	57125	N. T	580	2	0	0
24	57243	N. A	570	3	0	0
25	57253	N. A	618	0	-----	-----
	57254	N. T	486	2	0	0
26	57350	L. Tu	612	0	-----	-----
	57351	M. Gl	229	3	3	100.0
27	57762	L. Tu	573	3	0	0
	57763	L. Tu	573	1	0	0
	57764	L. Tu	621	2	0	0
	57765	L. Tu	595	0	-----	-----
28	57771	L. Tu	595	0	-----	-----
	57772	N. T	514	2	0	0
	57773	N. A	522	0	-----	-----
	57774	N. A	522	5	0	0

It will be noted that three nonbreast-cancer fostered females had young which showed a high breast-tumor ratio. These mice were from litters in which one or more breast-cancerous individuals were observed, as shown in table 4. All lived beyond the average breast-cancer age. As stated above, the breast-tumor ratio observed in the descendants of breast-cancer fostered females was 58.5 percent. The three nonbreast-cancer females had progeny which had a breast-cancer incidence of 57.7 percent.

TABLE 4.—*Breast-tumor incidence for the progeny of (A) breast-cancerous fostered females; and (B) nonbreast-cancerous fostered females transmitting this type of susceptibility. The incidence for the progeny of litter mates is also given*

(A) MAMMARY CANCER FOSTERED "A" MICE

[M. Gl.=mammary carcinoma; L. Tu.=lung carcinoma; N. T.=noncancerous; N. A.=no autopsy]

No.	Diagnosis	Age (days)	Descendants		Descendants of litter mates		Litter mates		
			Number	Percent with cancer	Number	Percent with cancer	No	Diagnosis	Age (days)
57351	M. Gl	229	3	100 0	0				
56632	M. Gl	269	3	100 0	0				
*38431	M. Gl	356	40	52 5	5	0	*38430	N. T	563
					111	5.4	*38432	L. Tu	563
					8	50.0	*38433	L. Tu	384
38714	M. Gl	365	2	0	52	1.9			
51241	M. Gl	383	33	63.6	3	0			
*56401	M. Gl	447	1	0	1	0	*56398	N. A	440
					8	50 0	*56402	N. T	447
					10	60.0	*56403	L. Tu	428
	Total		82	58 5					

(B) NONMAMMARY CANCER FOSTERED "A" MICE

No.	Diagnosis	Age (days)	Descendants: Number	Descendants: Percent with cancer	Descendants of litter mates: Number	Descendants of litter mates: Percent with cancer	Litter mates: No	Litter mates: Diagnosis	Litter mates: Age (days)
*38433	L. Tu	384	8	50.0	5	0	*38430	N. T	563
					40	52.5	*38431	M. Gl	356
					111	5 4	*38432	L. Tu	563
*56402	N. T	447	8	62 5	1	0	*56398	N. A	440
					1	0	*56401	M. Gl	447
*56403	L. Tu	428	10	60.0					
	Total		26	57 7					

*Litter mates.

If one female of a litter developed mammary carcinoma and transmitted the influence, not all of her litter mates did likewise. Litter No. 1 (tables 3 and 4) is an example. Female No. 38431 developed breast cancer and 52.5 percent of her descendants showed similar growths. Her sister, No. 38433, had lung carcinoma, and yet 50 percent of her progeny had breast cancer. Two other litter mates were nonbreast-cancerous and of their 116 descendants only 5 percent had mammary carcinoma.

While the incidence of breast cancer among the descendants of the breast-cancerous and the 3 nonbreast-cancerous fostered females is higher than was observed for the other classes of fostered animals, it is lower than was recorded in the control stock. In the first generation the progeny of the cancerous females showed an incidence of 80 percent (table 5). The ratio decreased with each succeeding generation and the fourth generation mice gave a ratio of 36.8 percent for the 19 animals observed. The progeny of the 3 noncancerous females gave similar results for the number of mice continued.

TABLE 5.—*Progeny and descendants of fostered mothers developing breast cancer and nonbreast-cancerous fostered females*

[M. Gl.=mammary carcinoma; N. T.=noncancerous; L. Tu.=lung carcinoma]

	Diagnosis and age (days)	1st generation		2d generation		3d generation		4th +	
		Cancer	N.T.	Cancer	N.T.	Cancer	N.T	Cancer	N.T.
Fostered breast-cancer mothers:									
No. 57351	M. Gl. 229	3	0						
No 50632	M. Gl. 269	3	0						
No 38431	M Gl 356	10	1	0	2	4	4	7	12
No 38714	M. Gl 365	0	2						
No 51241	M. Gl 383	4	1	9	3	8	8		
No. 56401	M. Gl 447	0	1						
Total		20	5	9	5	12	12	7	12
Percent with breast cancer		80 0		64.3		50 0		36 8	
Nonbreast-cancer fostered females:									
No 38433	L Tu 384	3	2	1	2				
No. 56402	N. T 447	5	3						
No 56403	L. Tu. 428	4	3	2	1				
Total		12	8	3	3				
Percent with breast cancer		60 0		50 0					

If any of the descendants of a tested nonbreast-cancerous fostered female develops breast cancer, do the progeny of this breast-cancerous female show a high breast-cancer ratio? Observations bearing on this point are tabulated in table 6. Five tested noncancerous fostered females are listed which had 201 descendants having a cancer ratio of 5.5 percent. Seven of their descendants had breast cancer and 3 had progeny which were mated. The 19 progeny showed an incidence of 5.3 percent. Ninety-nine descendents of litter mates of these 7 cancerous females were tested and 4.0 percent of the individuals had breast cancer.

TABLE 6.—*Progeny and descendants of nonbreast-cancerous fostered A stock mothers having breast-cancerous progeny and the incidence for the progeny of the fostered females, their breast-cancerous descendants, litter mates of the latter, and for fostered females which developed breast cancer*

[M. Gl.=mammary carcinoma; L. Tu.=lung carcinoma]

Fostered A females			Descendants		M. Gl. descendants			Progeny of M. Gl. descendants		Progeny of litter mates of M. Gl. descendants	
No.	Diagnosis	Age (days)	Number	Percent with cancer	No.	Diagnosis	Age (days)	Number	Percent with cancer	Number	Percent with cancer
38432	L. Tu	563	111	5.4	48612	M. Gl	390	15	6.7	59	7.0
					53968	M. Gl	337	2	0	4	0
					51753	M. Gl	210	0		18	0
38715	L. Tu	551	11	9.1	48588	M. Gl	303	0		6	0
51253	L. Tu	593	34	2.9	55573	M. Gl	214	0		5	0
51259	L. Tu	424	34	5.9	56517	M. Gl	357	0		2	0
51616	L. Tu	578	11	9.1	53646	M. Gl	305	2	0	5	0
	Total		201	5.5				19	5.3	99	4.0
Progeny of fostered breast-cancerous females								82	58.5		

Ten A fostered mothers are listed in table 7. Six of the 10 nursed progeny, numbering 29 mice, which were mated and no breast tumors resulted. Twenty-seven female progeny of these females were nursed by A high breast-tumor stock females and 88.9 percent of these mice developed mammary carcinoma.

TABLE 7.—*Breast-tumor incidence for the progeny and descendants of fostered A stock females which were nursed by the fostered females or by high cancer stock females*

[L. Tu.=lung carcinoma, N. T.=noncancerous; N. A.=no autopsy for lung carcinoma]

Fostered A mothers			Descendants nursed by fostered females		Descendants nursed by high cancer stock females	
No.	Diagnosis	Age (days)	Number	Percent with cancer	Number	Percent with cancer
56130	L. Tu	678	3	0	2	100.0
56131	N. T	512	8	0	2	100.0
56616	N. A	458	3	0	6	100.0
56637	N. A	653	0		3	33.3
56638	N. T	498	4	0	2	100.0
57120	L. Tu	581	6	0	2	100.0
57504	L. Tu	713	0		4	75.0
57774	N. A	522	5	0	4	100.0
57938	N. T	515	0		1	100.0
57955	L. Tu	502	0		1	100.0
	Total		29	0	27	88.9

DISCUSSION

If the cancerous transformation of mammary tissue of A stock breeding females is dependent on the action of three "influences" (*8, 9*), young nursed by low tumor strain females might lack only the

"influence" which apparently is carried in the milk of cancerous stock females. All mice of the inbred A strain should be homozygous for breast-cancer susceptibility and the hormonal stimulation of parity was probably also the same for breeding females of the control and fostered groups.

Young born to A stock high cancer mothers which were permitted to nurse for more than 24 hours before they were transferred showed no reduction in the observed breast-tumor ratio (table 2). As a significant decrease in the tumor incidence was noted for young which nursed their high tumor mothers for less than 24 hours, the time element between birth and the transfer of the young is very important. Evidently only a very small amount of the milk "influence" must be procured from the high breast-cancer stock mothers to initiate the development of breast cancer when the other influences are also present. As the nipples were not sealed, milk was available to the young before they were fostered, and 7.9 percent of the fostered females developed breast cancer. A sufficient number of the progeny of 4 of the 10 breast-cancer females which had been fostered were mated for testing purposes and gave observations which indicated that they had the "breast-cancer producing influence" in their milk, for a considerable percentage of their progeny showed breast cancer. Three litter mates of the tested breast-cancerous fostered females which died nonbreast-cancerous also behaved as cancerous parents. The first generation progeny of these mice had a breast-tumor ratio characteristic of the control A stock. The incidence decreased with each succeeding generation. In this respect the cancerous fostered females differed markedly from the cancerous and noncancerous females of the control line where the progeny showed a high breast-tumor ratio regardless of the diagnosis of the mother (*5*).

One or more of the progeny from 59 nonbreast-cancerous fostered females were continued. The incidence among their descendants was 6.1 percent (525 mice, table 1). If the animals descended from the 3 females which transmitted the breast-cancer tendency but which did not develop breast cancer are omitted, the percentage for the remaining 499 breeding animals was 3.4 percent, which was slightly less than was observed for the virgin females of the A stock (4.9 percent).

If breast cancer is observed in the progeny of the tested nonbreast-cancer females it is not transmitted. The percentages are 5.3 for the progeny of the cancerous mice and 4.0 for the progeny of their litter mates (table 6). Such growths apparently are not dependent on the presence of the milk influence, are not transmitted, and may have a different etiology than do breast carcinomata which are inherited.

If the young of noncancerous fostered A stock mice are given to control A stock females to be nursed the incidence observed in such a group is very high (table 7). These young differed from their mothers only in the source of the milk which they obtained while nursing; the mothers and the progeny which they suckled showed a low incidence; the young which were transferred to control A stock females showed a high breast-tumor ratio which was equal to that observed in the control stock.

SUMMARY

A study of the pedigree of the A stock fostered females indicates that:

1. The percentage of fostered females developing breast cancer is dependent largely upon the length of time they are permitted to nurse their high tumor stock mothers before they are transferred to low tumor stock females.
2. The progeny of breast-cancerous fostered females have a higher breast-cancer ratio than do the progeny of tested nonbreast-cancer mothers.
3. The incidence of breast cancer in the progeny of breast-cancerous fostered females decreases with each succeeding generation.
4. The progeny of tested nonbreast-cancerous fostered females show a low cancer ratio.
5. When breast cancer developed in the progeny of tested nonbreast-cancerous fostered females it was not transmitted.
6. The progeny of tested nonbreast-cancerous fostered females which were nursed by high breast-tumor stock females showed a high breast-cancer ratio.

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(*7*) ———— Relation of nursing to the extra-chromosomal theory of breast cancer in mice. Am. J. Cancer, **35**: 90 (1939).

(*8*) ———— Breast cancer in breeding and virgin A and B stock female mice and their hybrids. Pub. Health Rep., **54**: 1113 (1939).

(*9*) ———— The possible method of transmission of breast cancer susceptibility in mice. Am. J. Cancer. In press.

(*10*) Bittner, J. J. and Little, C. C.: The transmission of breast and lung cancer in mice. J. Heredity, **28**: 117 (1937).

(*11*) Strong, L. C.: The establishment of the A strain of inbred mice. J. Heredity, **27**: 21 (1936).

DEATHS DURING WEEK ENDED AUGUST 19, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 19, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,239	7,573
Average for 3 prior years	[1] 7,440	
Total deaths, first 33 weeks of year	280,219	273,443
Deaths under 1 year of age	478	534
Average for 3 prior years	[1] 514	
Deaths under 1 year of age, first 33 weeks of year	16,752	17,530
Data from industrial insurance companies:		
Policies in force	66,825,741	68,423,734
Number of death claims	10,794	10,854
Death claims per 1,000 policies in force, annual rate	8.4	8.3
Death claims per 1,000 policies, first 33 weeks of year, annual rate	10.5	9.4

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (...) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 26, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38 median
NEW ENG.												
Maine	0	0	3	1	...	...	...	...	36	6	...	7
New Hampshire	0	0	0	0	...	...	...	...	0	0	...	0
Vermont	0	0	0	0	...	...	...	...	214	16	2	7
Massachusetts	5	4	2	2	...	...	...	...	30	33	36	21
Rhode Island	0	0	0	0	...	...	...	...	84	11	4	3
Connecticut	0	0	0	1	...	...	3	...	27	9	4	8
MID. ATL.												
New York	3	8	9	11	[1] 1	[1] 2	[1] 3	[1] 2	26	64	93	93
New Jersey	0	0	8	8	2	2	8	6	12	10	12	32
Pennsylvania	7	13	15	20	...	...	...	...	14	28	35	39
E. NO. CEN.												
Ohio	6	8	13	13	2	2	...	2	11	14	20	17
Indiana	7	5	9	10	4	3	5	7	4	3	5	5
Illinois	10	15	14	15	3	4	3	4	8	12	36	36
Michigan [2]	14	13	6	6	1	1	1	...	0	0	39	24
Wisconsin	7	4	1	1	51	29	15	15	42	24	39	39
W. NO. CEN.												
Minnesota	6	3	6	1	2	1	2	...	45	23	18	2
Iowa [3]	4	2	2	2	...	...	...	...	16	8	10	3
Missouri	12	9	3	6	1	1	23	8	1	1	2	6
North Dakota	15	2	2	2	...	...	1	...	7	1	6	3
South Dakota	30	4	0	0	...	...	...	...	8	1	...	0
Nebraska	8	2	1	2	...	...	...	...	4	1	4	3
Kansas	8	3	2	3	3	1	...	...	81	11	9	5

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 26, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38 median
SO. ATL.												
Delaware	0	0	1	0					39	2		0
Maryland [3]	0	0	1	4			2	2	9	3	10	10
Dist. of Col	16	2	0	3	8	1			16	2	2	2
Virginia	34	18	23	22	39	21			9	5	15	16
West Virginia	8	3	6	10	22	8	13	13	3	1	2	5
North Carolina [3]	45	31	45	34			1		7	5	56	24
South Carolina [3]	25	9	35	9	391	143	112	80	11	4	27	4
Georgia [3]	66	40	35	20	2	1			3	2		0
Florida [3]	9	3	11	6	9	3			6	2		4
E. SO. CEN.												
Kentucky	30	17	9	15	5	3	6		3	2	3	31
Tennessee [3]	11	6	17	14	32	18	9	12	12	7	30	14
Alabama [3]	30	17	29	29	11	6	18	5	30	17	34	5
Mississippi [2,3]	48	19	15	15								0
W. SO. CEN.												
Arkansas	20	8	14	11	37	15	18	5	12	5	6	0
Louisiana [3]	12	5	11	11	17	7	7	7	2	1	3	3
Oklahoma	14	7	8	8	20	10	10	6	6	3	4	4
Texas [3]	19	23	41	39	30	36	98	28	13	16	15	8
MOUNTAIN												
Montana	9	1	1	1	84	9	12		56	6	30	4
Idaho	0	0	1	0			4	1	10	1	8	2
Wyoming	0	0	2	0					65	3		1
Colorado	48	10	7	4	10	2			14	3	2	4
New Mexico [3]	12	1	2	2			1		0	0	5	5
Arizona	74	6	0	2	184	15	18	7	37	3	3	2
Utah [1]	0	0	1	1	30	3			60	6	6	4
PACIFIC												
Washington	3	1	2	2					80	26	6	13
Oregon	15	3	0	1	5	1	10	8	45	9	5	5
California	14	17	12	19	7	8	12	11	40	49	99	49
Total	16	342	425	425	14	356	415	288	19	459	745	745
34 weeks	17	12,403	14,940	15,440	178	152,006	46,473	104,369	415	348,906	761,325	669,077

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	12	2	3	3
New Hampshire	0	0	0	0	0	0	0	0	0	0		0
Vermont	0	0	0	0	0	0	1	1	40	3	2	1
Massachusetts	0	0	0	1	2.4	2	4	4	14	12	25	34
Rhode Island	0	0	0	0	0	0	1	1	0	0		4
Connecticut	0	0	0	1	0	0	0	1	15	5	8	6
MID. ATL.												
New York	0.8	2	1	4	24	60	12	12	22	54	43	67
New Jersey	1.2	1	0	1	24	20	4	4	18	15	13	18
Pennsylvania	2	4	2	2	5	10	6	8	15	30	43	84

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug. 26, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934-38, median
E. NO. CEN.												
Ohio	0.8	1	1	1	1.5	2	4	8	33	43	35	51
Indiana	0	0	0	0	0	0	0	1	31	21	20	22
Illinois	0.7	1	2	4	9	14	11	14	33	51	52	66
Michigan [3]	0	0	0	0	122	115	2	9	39	37	40	46
Wisconsin	0	0	5	1	11	6	8	8	69	39	24	27
W. NO. CEN.												
Minnesota	0	0	0	0	74	38	2	2	31	16	16	16
Iowa	0	0	1	2	2	1	4	2	20	10	20	16
Missouri	0	0	1	1	2.6	2	2	1	19	15	22	21
North Dakota	0	0	1	0	15	2	0	0	29	4	5	9
South Dakota	0	0	0	0	23	3	2	1	60	8	7	3
Nebraska	0	0	0	0	0	0	2	2	19	5	1	3
Kansas	2.8	1	0	1	2.8	1	0	0	53	19	18	18
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	0	0	0	0
Maryland [3]	3	1	0	0	3	1	0	0	22	7	3	18
Dist. of Col	0	0	0	1	8	1	2	2	40	5	5	5
Virginia	0	0	0	1	1.9	1	4	4	45	24	7	11
West Virginia	0	0	1	1	0	0	0	4	65	24	6	19
North Carolina [3]	1.5	1	2	1	13	9	2	2	35	24	21	16
South Carolina [3]	2.7	1	0	0	44	16	1	1	14	5	9	2
Georgia [3]	0	0	0	0	7	4	2	1	13	8	15	10
Florida [3]	0	0	0	0	6	2	0	0	6	2	3	2
E. SO. CEN.												
Kentucky	0	0	0	1	1.7	1	0	5	47	27	16	16
Tennessee [3]	0	0	1	1	4	2	2	6	28	16	12	15
Alabama [3]	1.8	1	1	1	1.8	1	1	4	46	26	9	9
Mississippi [2,3]	0	0	0	0	2.5	1	1	1	10	4	8	5
W. SO. CEN.												
Arkansas	0	0	1	0	2.5	1	1	1	22	9	5	6
Louisiana [3]	0	0	1	1	2.4	1	0	2	24	10	3	2
Oklahoma	4	2	0	0	2	1	1	1	10	5	17	9
Texas [3]	0.8	1	3	1	8	10	3	4	21	25	23	20
MOUNTAIN												
Montana	9	1	0	0	0	0	5	1	56	6	7	6
Idaho	0	0	0	0	0	0	0	0	10	1	6	5
Wyoming	0	0	0	0	0	0	0	0	65	3	3	3
Colorado	5	1	1	1	14	3	0	0	34	7	10	8
New Mexico [3]	12	1	0	1	37	3	0	0	37	3	1	2
Arizona	0	0	0	0	37	3	0	0	12	1	1	1
Utah [3]	10	1	0	0	20	2	0	1	139	14	4	5
PACIFIC												
Washington	0	0	0	0	3	1	0	2	19	6	10	10
Oregon	0	0	0	0	5	1	0	0	10	2	4	8
California	0	0	0	2	41	50	4	24	36	44	63	59
Total	0.8	21	25	51	16	391	94	289	28	697	666	843
34 weeks	1.6	1,408	2,188	4,221	3	2,539	1,027	4,054	137	117,179	137,851	165,702

For footnotes see end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Aug 26, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases	1934–38, median	Aug. 26, 1939, rate	Aug. 26, 1939, cases	Aug. 27, 1938, cases
NEW ENG											
Maine	0	0	0	0	6	1	2	6	175	29	37
New Hampshire	0	0	0	0	0	0	0	1	0	0	0
Vermont	0	0	0	0	0	0	2	0	724	54	29
Massachusetts	0	0	0	0	5	4	4	3	112	95	94
Rhode Island	0	0	0	0	15	2	2	1	183	24	------
Connecticut	0	0	0	0	12	4	4	1	223	75	67
MID ATL.											
New York	0	0	0	0	6	14	43	30	144	359	731
New Jersey	0	0	0	0	8	7	3	9	130	109	279
Pennsylvania	0	0	0	0	6	12	25	26	118	232	212
E. NO. CEN.											
Ohio	2	3	0	0	12	15	17	27	113	147	214
Indiana	0	0	2	1	7	5	16	11	74	50	16
Illinois	5	8	4	0	15	23	29	29	134	205	522
Michigan [2]	0	0	1	1	7	7	13	14	191	181	296
Wisconsin	5	3	0	0	16	9	1	2	262	149	341
W. NO CEN.											
Minnesota	0	0	0	0	8	4	1	3	81	42	47
Iowa	6	3	0	1	57	28	3	4	26	13	48
Missouri	0	0	0	0	33	26	25	23	39	30	20
North Dakota	15	2	1	0	37	5	0	1	226	31	22
South Dakota	15	2	0	0	23	3	1	1	23	3	7
Nebraska	0	0	0	0	4	1	0	1	15	4	10
Kansas	6	2	1	0	17	6	[illegible]	11	70	25	72
SO. ATL.											
Delaware	0	0	0	0	0	0	0	1	59	3	3
Maryland [2]	0	0	0	0	22	7	21	20	173	56	30
District of Columbia	0	0	0	0	8	1	3	3	283	35	7
Virginia	0	0	0	0	37	20	19	20	107	57	28
West Virginia	0	0	1	0	16	6	22	22	19	7	13
North Carolina [3]	1	1	0	0	20	14	20	20	167	114	169
South Carolina [3]	0	0	0	0	19	7	14	16	49	18	70
Georgia [3]	2	1	0	0	46	28	37	30	10	6	24
Florida [3]	0	0	0	0	9	3	10	1	18	6	16
E. SO. CEN.											
Kentucky	0	0	0	0	52	30	31	56	70	40	57
Tennessee [3]	0	0	0	0	26	15	17	47	74	42	18
Alabama [3]	0	0	0	0	30	17	19	22	79	45	64
Mississippi [2, 3]	0	0	0	0	38	15	8	8	------	------	------
W. SO. CEN.											
Arkansas	0	0	0	0	55	22	35	14	15	6	23
Louisiana [3]	0	0	0	0	70	29	14	23	7	3	15
Oklahoma	4	2	0	0	48	24	26	24	12	6	8
Texas [3]	0	0	2	0	23	28	46	50	49	59	101
MOUNTAIN											
Montana	0	0	2	2	9	1	2	3	19	2	70
Idaho	10	1	2	0	10	1	1	1	31	3	7
Wyoming	0	0	0	0	44	2	0	0	0	0	3
Colorado	5	1	4	0	5	1	6	6	48	10	40
New Mexico [3]	0	0	1	0	12	1	4	7	74	6	12
Arizona	12	1	1	0	61	5	7	5	736	60	17
Utah [2]	0	0	0	0	60	6	3	1	497	50	24
PACIFIC											
Washington	0	0	7	7	12	4	7	4	43	14	37
Oregon	0	0	4	1	30	6	4	4	60	12	13
California	3	4	1	1	8	10	6	11	74	90	116
Total	1	34	34	34	19	479	584	633	105	2,607	4,049
34 weeks	10	8,691	12,727	6,118	9	7,584	8,726	8,818	154	129,238	148,064

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Aug. 26, 1939, 122 cases as follows: North Carolina, 2; South Carolina, 10; Georgia, 46; Florida, 14; Tennessee, 2; Alabama, 18; Mississippi, 1; Louisiana, 7; Texas, 20; New Mexico, 2.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Sept. 2, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Week ended Aug. 19	Week ended Aug. 26	Week ended Sept. 2
Eastern:									
New York				3	3	1			1
New Jersey				4	8	7	6	1	1
Pennsylvania				6	3	4		1	
Delaware				3			1		
Maryland			7	13	11	23	2	6	3
District of Columbia			2	2	2	3	1	1	
Virginia			1	13	10	11	2	1	2
West Virginia						1			
North Carolina				3	13	13	3	2	
Georgia					1	1			
Central:									
Ohio				3	2	4		3	
Indiana				2	1	3	2	1	
Illinois			1	1	5	7	1		
Kentucky							3	2	
Tennessee					5	5	4	2	1
Iowa			1	10	9	6	1		
Missouri				1		4	1	1	1
Western:									
Montana	[1] 2	2	8	5	1	2			1
Idaho		4	7	4	5				
Wyoming		3	14	16	5	5			
Colorado		2	3	9	4				
Utah		2	5	5	6	2			
Washington		2	3	2					
Oregon		9	16	7	2	1			

[1] 1 other case was reportedl n Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
July 1939										
Nebraska	1	6			30		4	18	11	0
Nevada	0	0					0	1	0	0
Oregon	0	7	30	2	192		1	28	2	9
Washington	0	6	5		1,180		0	38	5	10

July 1939

	Cases
Chickenpox:	
Nebraska	7
Oregon	51
Washington	205
Dysentery:	
Oregon (amoebic)	1
Encephalitis, epidemic or lethargic:	
Oregon	1
Washington	1
Enteritis.	
Washington (under 2 yrs.)	3
Washington (over 2 yrs.)	2
German measles:	
Washington	3
Impetigo contagiosa:	
Oregon	11
Washington	1
Mumps:	
Nebraska	20
Nevada	5
Oregon	69
Washington	40
Rabies in animals:	
Washington	18
Rocky Mountain spotted fever:	
Oregon	3
Scabies:	
Oregon	11
Septic sore throat:	
Nebraska	1
Oregon	8
Washington	3
Trachoma:	
Oregon	4
Tularaemia:	
Nevada	3
Undulant fever:	
Oregon	1
Washington	1
Vincent's infection:	
Oregon	5
Whooping cough:	
Nebraska	120
Oregon	70
Washington	69

WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 19, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	88	34	11	256	282	247	3	342	85	1,303	------
Current week [1]	68	45	8	173	229	157	2	315	63	1,063	------
Maine:											
Portland	0	------	0	1	0	1	0	0	0	8	26
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	12
Manchester	0	------	0	0	1	0	0	0	0	0	9
Nashua	0	------	0	1	0	1	0	0	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	6	3
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	13
Massachusetts:											
Boston	3	------	0	14	11	0	0	6	2	30	189
Fall River	1	------	0	0	1	0	0	1	0	7	21
Springfield	0	------	0	0	0	0	0	0	0	3	30
Worcester	0	------	0	3	3	1	0	0	0	23	47
Rhode Island:											
Pawtucket	0	------	------	0	------	0	0	------	0	0	------
Providence	0	1	0	15	0	1	0	2	0	14	46
Connecticut:											
Bridgeport	0	------	0	2	0	0	0	1	0	0	30
Hartford	0	------	0	0	1	0	0	0	0	2	29
New Haven	0	------	0	5	0	0	0	0	0	4	45
New York:											
Buffalo	0	------	0	2	5	6	0	9	0	9	115
New York	7	6	1	24	32	13	0	65	4	114	1,258
Rochester	0	2	0	3	6	1	0	0	0	7	66
Syracuse	0	------	0	0	0	0	0	1	0	41	40
New Jersey:											
Camden	0	------	0	1	0	2	0	0	0	4	24
Newark	0	------	0	0	1	1	0	5	1	32	78
Trenton	0	------	0	0	0	1	0	3	0	3	31
Pennsylvania:											
Philadelphia	1	------	0	5	13	6	0	15	6	122	426
Pittsburgh	2	2	0	0	6	0	0	11	1	23	122
Reading	2	------	0	1	0	0	0	1	0	0	20
Scranton	0	------	------	0	------	0	0	------	1	0	------
Ohio:											
Cincinnati	1	------	1	1	3	3	0	5	0	13	100
Cleveland	0	1	0	6	4	10	0	14	1	55	177
Columbus	3	------	0	2	4	2	0	0	2	7	77
Toledo	0	------	0	5	3	2	0	1	0	20	67
Indiana:											
Anderson	0	------	0	0	0	0	0	1	0	5	6
Fort Wayne	1	------	0	0	2	0	0	1	0	0	20
Indianapolis	2	------	0	3	4	3	0	4	1	37	104
Muncie	0	------	0	0	0	1	0	0	0	1	9
South Bend	0	------	0	0	0	0	0	0	0	0	11
Terre Haute	0	------	0	0	0	0	0	0	0	0	19
Illinois:											
Alton	0	------	0	0	0	0	0	0	1	1	6
Chicago	7	------	0	3	15	17	0	40	0	97	579
Elgin	0	------	0	0	0	0	0	0	0	13	18
Moline	0	------	0	0	0	0	0	0	0	2	9
Springfield	0	------	0	0	1	0	0	0	0	0	17
Michigan:											
Detroit	5	2	0	4	4	10	0	12	5	56	215
Flint	1	------	0	0	0	2	0	1	0	8	19
Grand Rapids	0	------	0	4	0	3	0	0	0	3	29
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	1	6
Madison	1	------	0	1	0	0	0	1	1	13	21
Milwaukee	0	------	0	2	0	7	0	2	0	20	74
Racine	0	------	0	1	0	0	0	0	0	7	7
Superior	0	------	0	0	0	2	0	0	0	0	9

[1] Figures for Salt Lake City estimated; report not received.

City reports for week ended Aug. 19, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	2	0	0	0	2	0	1	22
Minneapolis	0	------	0	2	2	2	0	1	0	10	84
St. Paul	0	------	------	0	------	3	0	------	0	31	------
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	1	------	2	1	------	1	0	------
Des Moines	0	------	0	0	0	2	0	0	0	0	29
Sioux City	0	------	------	0	------	0	0	------	0	1	------
Waterloo	0	------	------	0	------	3	0	------	0	2	------
Missouri											
Kansas City	0	------	0	0	3	0	0	4	2	0	87
St. Joseph	0	------	0	0	1	1	0	2	1	0	15
St. Louis	0	------	1	0	2	4	0	1	4	24	180
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	1	1	6
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	3
South Dakota:											
Sioux Falls	0	------	0	0	0	1	0	0	0	0	7
Nebraska:											
Lincoln	1	------	0	1	0	1	0	0	0	6	11
Omaha	4	------	0	0	3	0	0	1	0	2	49
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	2
Topeka	0	------	0	0	1	0	0	0	0	0	10
Wichita	0	------	0	0	1	0	0	0	0	7	24
Delaware:											
Wilmington	0	------	0	0	2	0	0	0	0	3	22
Maryland:											
Baltimore	3	------	0	0	9	1	0	15	0	49	190
Cumberland	0	------	0	0	1	1	0	0	0	0	10
Frederick	0	------	0	0	0	0	0	1	0	0	3
District of Columbia:											
Washington	0	------	0	6	9	5	0	6	3	39	153
Virginia:											
Lynchburg	0	------	0	4	0	0	0	0	0	18	11
Norfolk	1	------	0	0	3	0	0	1	0	0	24
Richmond	0	------	0	0	1	2	0	2	0	1	45
Roanoke	0	------	0	4	3	0	0	0	0	1	15
West Virginia:											
Charleston	0	------	0	0	1	1	0	1	0	0	20
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	1	0	0	0	1	0	0	20
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	0	0	0	1	0	4	14
Wilmington	0	------	0	0	0	0	0	0	0	0	13
Winston-Salem	0	------	0	0	0	0	0	1	0	0	11
South Carolina:											
Charleston	0	15	1	0	3	0	0	0	3	0	19
Florence	0	------	0	0	0	0	0	0	0	0	8
Greenville	0	------	0	0	0	0	0	0	0	2	20
Georgia:											
Atlanta	1	1	1	0	3	4	0	8	4	0	77
Brunswick	0	------	0	0	0	0	0	1	0	0	6
Savannah	0	2	0	0	0	0	0	2	0	1	24
Florida:											
Miami	0	------	0	0	1	0	0	0	1	0	16
Tampa	1	2	2	1	3	0	0	0	1	1	30
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	1	0	5
Covington	0	------	0	0	1	2	0	2	0	0	13
Lexington	0	------	0	0	0	0	0	0	6	1	17
Louisville	0	------	0	1	2	1	0	5	0	19	88
Tennessee:											
Knoxville	2	------	0	0	2	3	0	0	3	0	26
Memphis	0	------	0	2	2	0	0	3	0	18	67
Nashville	4	------	0	0	1	3	0	0	1	18	28
Alabama:											
Birmingham	1	------	0	0	5	0	0	1	3	0	55
Mobile	0	4	0	0	0	4	0	0	0	1	20
Montgomery	0	------	------	0	------	0	0	------	1	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	1	0	2	0	0	5	1	0	8

City reports for week ended Aug. 19, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	2	1	0	0	0	0	0	6
New Orleans	1	1	0	3	9	3	0	7	8	5	130
Shreveport	0	------	0	0	5	2	0	1	2	0	38
Oklahoma:											
Oklahoma City	1	------	0	0	3	2	0	2	0	0	36
Tulsa	0	------	------	0	------	0	0	------	2	0	------
Texas:											
Dallas	6	------	0	1	4	1	0	4	1	8	72
Fort Worth	0	------	0	0	1	1	0	1	0	0	24
Galveston	0	------	0	0	2	0	0	0	0	0	12
Houston	1	------	0	0	7	0	0	3	0	0	64
San Antonio	1	1	0	0	2	0	0	7	0	1	60
Montana:											
Billings	0	------	0	0	0	0	0	0	0	2	9
Great Falls	0	------	0	3	0	5	0	0	0	0	4
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	0	0	0	0	0	2	0	6
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	11
Colorado:											
Colorado Springs	0	----	0	0	0	4	0	1	0	0	13
Denver	5	----	0	1	7	3	0	1	1	10	77
Pueblo	0	------	0	0	1	0	0	1	0	1	8
New Mexico:											
Albuquerque	0	-----	0	0	0	1	0	2	0	0	12
Utah:											
Salt Lake City	------	----	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	1	-----	0	13	2	2	0	2	1	4	95
Spokane	0	----	0	3	1	3	0	0	1	1	46
Tacoma	0	----	0	6	0	0	0	0	0	0	30
Oregon:											
Portland	0	----	0	0	2	0	0	3	0	0	54
Salem	0	------	------	1	----	1	0	------	0	3	------
California:											
Los Angeles	1	5	0	12	3	10	0	24	0	21	303
Sacramento	2	------	0	1	2	0	0	1	0	0	27
San Francisco	0	------	0	2	7	2	0	6	0	2	155

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	0	1
New York:			
Buffalo	0	0	15
New York	6	2	16
Rochester	0	0	1
New Jersey:			
Camden	0	0	5
Newark	1	0	0
Pennsylvania:			
Philadelphia	0	0	19
Pittsburgh	0	0	3
Ohio:			
Cleveland	0	0	3
Illinois:			
Chicago	0	0	6
Springfield	0	0	1
Michigan:			
Detroit	0	0	66
Wisconsin:			
Kenosha	0	0	1
Madison	0	0	1
Milwaukee	0	0	1
Minnesota:			
Minneapolis	0	0	11
Missouri:			
Kansas City	1	0	1
Nebraska:			
Lincoln	1	0	0
Maryland:			
Baltimore	1	0	1
District of Columbia:			
Washington	0	0	4
North Carolina:			
Wilmington	0	0	1
South Carolina:			
Charleston	0	0	5
Florida:			
Miami	0	0	1
Texas:			
Houston	0	0	3
Colorado:			
Denver	0	0	1
Pueblo	0	0	2
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	15
Sacramento	0	0	1
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 2; Alton, Ill., 1.
Pellagra.—Cases: Baltimore, 1; Charleston, S. C., 1.
Rabies in man.—Deaths: Chicago, 1.
Typhus fever.—Cases: Boston, 1; New York, 1; Charleston, S. C., 3; Atlanta, 3; Tampa, 1; Birmingham, 1; Mobile, 3; Montgomery, 2; New Orleans, 1; Dallas, 1; Fort Worth, 1; Houston, 1; Los Angeles, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 22, 1939.—During the week ended July 22, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7		43	102	14	14	23	22	225
Diphtheria		3	4	25	1	5				38
Influenza		6							24	30
Measles		25	4	212	252	32		2	5	532
Mumps					22	4	1	3		30
Pneumonia		7			7				7	21
Poliomyelitis					14		1			15
Scarlet fever	1	1	11	83	64	5	2	11	1	179
Smallpox						1				1
Tuberculosis	4	4	10	102	53	4	2	5		184
Typhoid and paratyphoid fever			2	11	4	2	4		2	25
Whooping cough		49	6	76	74	11	19		9	244

CUBA

Habana—Communicable diseases—4 weeks ended July 29, 1939.—During the 4 weeks ended July 29, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	15	2	Scarlet fever	4	
Leprosy	1		Tuberculosis	1	1
Malaria	6	1	Typhoid fever	26	3
Poliomyelitis	10	1			

FINLAND

Communicable diseases—July 1939.—During the month of July 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	164	Paratyphoid fever	77
Dysentery	2	Poliomyelitis	5
Influenza	458	Scarlet fever	300
Lethargic encephalitis	1	Typhoid fever	14

SWEDEN

Notifiable diseases—June 1939.—During the month of June 1939, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Scarlet fever	4,464
Diphtheria	3	Syphilis	39
Dysentery	11	Typhoid fever	9
Gonorrhea	969	Undulant fever	9
Paratyphoid fever	54	Weil's disease	5
Poliomyelitis	5		

YUGOSLAVIA

Communicable diseases—4 weeks ended July 16, 1939.—During the 4 weeks ended July 16, 1939, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	40	1	Paratyphoid fever	44	1
Cerebrospinal meningitis	37	9	Poliomyelitis	9	
Diphtheria and croup	358	15	Scarlet fever	169	1
Dysentery	38	4	Sepsis	4	2
Erysipelas	138	4	Tetanus	48	12
Favus	10		Typhoid fever	194	7
Lethargic encephalitis	2		Typhus fever	28	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of August 25, 1939, pages 1573–1585. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Iraq—Basra.—According to a report dated August 23, 1939, 1 suspected case of cholera has occurred in Basra, Iraq.

Plague

Dutch East Indies—Java—Batavia.—During the week ended August 19, 1939, 1 imported case of plague was reported in Batavia, Java, Dutch East Indies.

Smallpox

Algeria—Oran Department—Perregaux.—During the week ended July 29, 1939, 2 cases of smallpox were reported in Perreguax, Oran Department, Algeria.

Public Health Reports

VOLUME 54 SEPTEMBER 15, 1939 NUMBER 37

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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CONTENTS

PREVALENCE OF DISEASE

Public Health Reports

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PREVALENCE OF POLIOMYELITIS

There were 436 cases of poliomyelitis reported in the United States during the week ended September 9, as compared with 479 cases during the preceding week and a median of 294 cases for the corresponding week of the years 1934–38. This is the first week this summer in which a decrease in the number of cases has been reported. In recent years the summer rise in the incidence of poliomyelitis has reached its peak by about the third week in September. If the current incidence follows the same pattern, a decrease in the number of cases may be expected within the next few weeks.

New York, with 88 cases (16 in New York City and 40 in Buffalo), Michigan, with 66 cases (34 in Detroit), Minnesota, with 46 cases (16 in Minneapolis), California, with 45 cases (6 in Los Angeles), and Pennsylvania, with 20 cases (25 cases were reported in Philadelphia), showed decreases as compared with the preceding week. The number of cases reported in New Jersey increased from 10 during the week ended September 2, to 43 during the current week. Eleven cases were reported in Camden. Small increases also were reported in Ohio, with 17 cases, Illinois, with 13 cases, and South Carolina and Texas, with 12 cases each. Over 80 percent of the reported cases occurred in these 10 States.

THE NATIONAL HEALTH SURVEY*

SCOPE AND METHOD OF THE NATION-WIDE CANVASS OF SICKNESS IN RELATION TO ITS SOCIAL AND ECONOMIC SETTING

By George St. J. Perrott, *Principal Statistician*, Clark Tibbitts, *Field Director*, and Rollo H. Britten, *Senior Statistician, United States Public Health Service*

During the winter of 1935–36 the United States Public Health Service inquired into the state of the Nation's health and underlying

* From the Division of Public Health Methods, National Institute of Health. The National Health Inventory, of which the house-to-house canvass here reported constituted the major part, was a project executed with the aid of grants from the Works Progress Administration. Other phases of the Inventory dealing with health and medical facilities, occupational morbidity and mortality, and communicable diseases, are reported separately. The National Health Survey was carried out in cooperation with the State and local health authorities and various agencies, including medical societies, churches, and special groups. Such cooperation was extremely important in making the undertaking successful.

social and economic factors by means of a house-to-house canvass of over 700,000 households in urban communities in 18 States [1] and 37,000 households in rural areas in 3 States. The present paper sets forth the purpose and scope of the survey, outlines in some detail the method of sampling and canvassing, compares various aspects of the population with 1930 Census data as a rough measure of the reliability of the Health Survey sample, and records the major definitions employed in the survey. Subsequent papers to be published in the PUBLIC HEALTH REPORTS or as special monographs will present the detailed findings.

SCOPE OF THE SURVEY

The data necessary for comprehensive analysis of national health problems are not available from regularly compiled records. Local, State, and Federal health agencies collect information principally on births, deaths, and a limited list of incompletely reported communicable diseases. On the frequency of accidents and disabilities resulting therefrom, only approximate estimates based on records of insurance companies, workmen's compensation commissions, and industrial and safety organizations have been available. As to the provision of medical care, records of doctors, hospitals, and health agencies lack the uniformity and centralization necessary for statistical comparisons. Any adequate picture of care received in relation to needs can be obtained only through family reporting.

The Health Survey procedures were based upon techniques developed by the Public Health Service during 20 years of experience with the family canvass as a method of studying sickness and related economic factors. Earlier important surveys include a series of canvasses in South Carolina cotton-mill villages by the Public Health Service, 1916–18; studies made in Hagerstown, Md., 1921–24; a survey of 9,000 families in 130 communities, made in cooperation with the Committee on the Costs of Medical Care, 1928–31; and the Health and Depression Studies carried on among 11,500 wage earners' families in 8 large cities and 2 groups of coal-mining and cotton-mill villages in 1933. None of the previous surveys covered more than about 10,000 families, whereas the present one included three-quarters of a million families. A large scale survey was needed to permit highly detailed classifications and adequate study of illnesses of long duration or of infrequent occurrence.

The urban surveyed population was so distributed as to give a sample which was, in general, representative of cities in the United States, according to size and region. In large cities (100,000 popula-

[1] See Appendix B.

tion and over) the population to be canvassed was determined by a random selection of many small districts, based on those used in the United States Census of 1930. In the smaller cities selected for study all the population was enumerated.

Data requested from each family [2] included:

1. Population and related data: Age, sex, color, marital condition, nativity, usual occupation, employment status, family income and relief status, value of home or rent charged, number of rooms in the dwelling, and sanitary facilities.

2. Morbidity data (frequency, nature, duration, etc.) concerning: (*a*) Illness keeping a person from work, school, or other usual activity on the day of the canvass; (*b*) illness which had disabled a person in the above sense continuously for 7 days or more during the 12 months preceding the date of the canvass; [3] (*c*) chronic disease, whether or not it had caused disability; (*d*) gross physical impairment, including lost and impaired legs, feet, arms, and fingers, and total or partial blindness and deafness.[4]

3. Certain data on the kind and amount of medical care: Number of calls by doctors, days spent in hospital, days of private duty nursing, and the number of calls by a visiting nurse.

A copy of the schedule used in collecting these data is included in this report (Appendix A).[5]

METHODS AND TECHNIQUES

Selection of the sample.—The reports in general are based on schedules taken in 83 [6] cities for 703,092 households, comprising 2,502,391 individuals, or a number equivalent to 3.6 percent of the urban population of the United States as reported in the 1930 Census. An additional 36,801 households, comprising 140,418 persons, were canvassed in 23 primarily rural counties, in order that at least indicatory data might be obtained on the rural health problem.

[2] The information was obtained by interviews with the housewife or other responsible member of the household

[3] Data were also obtained for hospital cases, confinements, and fatal cases which had disabled for less than 7 days.

[4] A supplementary clinical study of hearing was carried out for the purpose of checking the reports on this subject made by the family. Auditory acuity measurements, otological examinations, and medical histories were obtained for a stratified sample of about 9,000 persons enumerated in the general survey. See list of bulletins on this phase in Appendix C

[5] The general nature of the items on which information was secured is largely self-evident from the schedule form. It might be mentioned that for column 15 the information was secured as to whether the person was employed, on work relief, seeking work, retired, not seeking work because of chronic disability, a housewife, at school, or at home. In column 33 three classes were recorded as to termination of the illness. Still disabled (i. e., on day of visit); recovered in the sense of being able to pursue usual activity; died. In the case of accidents and impairments resulting from accidents, information was obtained as to the place of occurrence (home, public, occupational) and whether or not the accident was an automobile accident.

[6] The original sample included 95 cities, but some of them were dropped for various administrative reasons. Their deletion did not materially affect the representativeness of the sample.

The 83 cities were distributed so as to be representative of 4 main geographic regions, Northeast, North Central, South, and West.[7]

The cities to be studied and the number of schedules to be taken in each one were determined according to a plan designed to result in (1) a population distributed according to geographic area in approximately the same proportion as was the total urban population in 1930, and (2) inclusion of cities distributed among 4 different size-groups—500,000 population or more; 100,000 to 500,000; 25,000 to 100,000; and less than 25,000 population.

The sample was selected as follows: Before choosing the study communities, all cities of 2,500 or more population in the United States were classified on the basis of the 4 regions and according to the size-groups within each region. Cities were then selected to obtain, insofar as possible, size and geographic representation similar to that of these classes.

In order to avoid too great over-representation of large city populations, 32 large cities (of which 31 were over 100,000 in population) were sampled, while 51 smaller cities were completely canvassed. The samples enumerated in the larger cities varied from 5,000 to 45,000 households, not according to a fixed ratio but on the basis of the number believed adequate to represent the individual community, and the number required on the basis of regional and size distribution. In the cities which were not completely canvassed the proportion of surveyed households to total households ranged from 1 in 2 in the smaller cities to about 1 in 38 in the largest cities.

The geographic distribution of the survey sample corresponded very closely to that of the 1930 urban population, as shown in table 1. Financial, administrative, and time considerations made it impossible to include the very large number of small cities necessary to give a sample population distributed by city-size group in the same proportion as the 1930 urban population. Each size-group was nevertheless well represented.

Appendix B shows the survey cities arranged according to region and size-group. Figure 1 shows the location of the cities surveyed.[8]

The proportion of households to be visited in a given sampled city was obtained by dividing the predetermined survey quota of households by the estimated total number of households in the community.[9] The sampling ratio for each city having been determined, the best

[7] The Health Survey States included in the 4 regions are: Northeast—Massachusetts, New Jersey, New York, Pennsylvania; North Central—Illinois, Michigan, Minnesota, Missouri, Ohio; South—Alabama, Georgia, Louisiana, Texas, Virginia; West—California, Oregon, Utah, Washington.

Northeast includes the New England and Middle Atlantic groups of the conventional Census classification; North Central includes East and West North Central; South includes South Atlantic and East and West South Central; West includes Mountain and Pacific.

[8] The 23 rural counties which were studied are located in 3 States and, of course, are not representative of the whole rural population. Sixteen are in Georgia, 4 in Michigan, and 3 in Missouri.

[9] The total number of households was estimated by dividing the city population in 1930 by 4, the approximate average number of persons per family in urban United States in 1930.

TABLE 1.—*Comparative percentage distributions of urban Health Survey and urban 1930 Census populations by geographic area and city size*

Region	Regional distribution		City size	City size distribution	
	Health Survey	1930 urban		Health Survey	1930 urban
All	100	100	All	100	100
Northeast	37	39	500,000 or more	43	29
North Central	83	33	100,000 to 500,000	31	23
South	18	18	25,000 to 100,000	14	19
West	12	10	Under 25,000	12	29

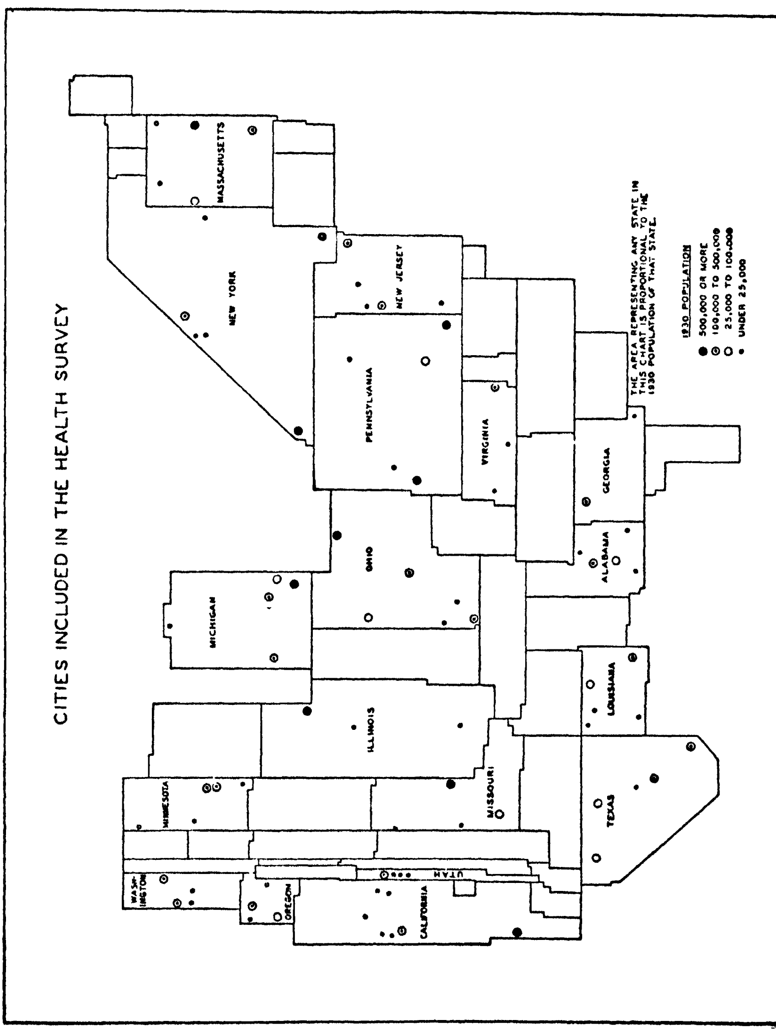

FIGURE 1.

method of identifying households for canvass would have been to make a random selection from a complete list of households in each city, but, unfortunately, no such list was available (except for New York City, where the list was used). The next best unit would have been city blocks; however, the preparation of such a list was impossible in the time available. Hence, it was decided to use groups of city blocks, known as enumeration districts and set up by the Bureau of the Census in 1930. These groups represented units of population in each city and provided convenient assignments for squads of enumerators. Their sampling utility was limited, however, because frequently it was impossible to include enough of them to make certain that each population group within a city would be adequately represented. This difficulty was anticipated, and it was possible partially to avoid it by subdividing larger enumeration districts.[10] A number was assigned to each of these subdistricts (following the numerical order of the enumeration districts themselves), and the appropriate sample was then selected from this list. Thus, if it had been determined that the survey was to include one-eleventh of the population, every eleventh enumeration district or subdistrict was selected from the new list. The sample so obtained no doubt fails in some cases properly to represent minority populations in particular cities, but does serve adequately for groups of cities.

In connection with the question of representativeness of the sample, mention should be made of classes of persons excluded under the definitions set up, provided they had been absent from their own households for a month or longer.[11] These are: (*a*) Persons in penal institutions; (*b*) residents of Army and Navy posts and barracks, orphanages, and homes for the aged; (*c*) persons in hotels, rooming houses, and missions who had not been in their present abode for a month or longer.

Selection of enumerators.—The Health Survey,[12] being financed as a

[10] Enumeration districts with populations (in 1930) of more than 1,000 but less than 2,000 were divided into 2 subdistricts of equal residential area those having populations of from 2,000 to 3,000 were divided into 3 sections, and so on

[11] Persons away from a given household for a month or longer were excluded from the roster of that household, because the informant could not be expected to be cognizant of their illnesses. However, except in the cases specified in the text, such persons (or equivalent persons) would be enumerated in other households.

Schedules and instructions provided for the entry of persons who had gone from the given household to an institution for the care of disease at any time previously (and were still there), but obviously such a record cannot fail to be incomplete Such persons are excluded from the Health Survey population if they were confined in the institution for the 12 months immediately preceding the canvass. They are, however, included in the illness record.

[12] The States in which the survey was conducted were divided into 5 administrative regions. Each region was assigned to a regional supervisor who had had successful survey experience and who was given training on the schedule and instructions for about 2 weeks before being sent into the field. Each State was assigned to a State supervisor, who was responsible for procurement of space and office equipment, preparation of pay rolls, and accounting.

Each of the local units was placed under the direction of a supervisor. In the larger cities there were one or two assistants, depending on the size of the staff. The enumeration was conducted by groups of from 5 to 8 canvassers working under the direction of squad leaders. A control clerk had charge of the schedules while they were in the local office.

work relief project, drew its canvassing staff from the relief rolls. Through the cooperation of the United States Employment Service and the Works Progress Administration it was possible, for the most part, to select mature persons with previous white-collar work experience. Preference was given to those who had been bookkeepers, teachers, nurses, salesmen, and social workers.[13] Many had had experience on other surveys. Final selection was made on the basis of aptitude tests.[14]

Methods of securing accuracy of schedule entries.—Certain procedures carried out for the purpose of obtaining the greatest possible accuracy of schedule entries should be summarized:

(1) Training in the basic principles underlying these instructions was given to the regional supervisors in the central office before they went into the field. Although the local supervisors and assistants could not be brought to a central point for such training, they received careful instructions from the regional supervisors, frequently at a central point.

(2) Systematic training of enumerators for 10 days or longer was practiced routinely.

(3) Each enumerator was furnished with mimeographed instructions setting forth the proper technique of making the interview and the definitions to be followed with respect to each item on the schedule.

(4) To cover unusual cases, a special manual was placed in the hands of squad leaders so that they could intelligently assist the enumerator when uncertainties as to proper entries arose.

(5) A reviewing staff to examine schedules for completeness and consistency was established in each local office in the ratio of 1 editor to 3 enumerators. In the case of unsatisfactory schedules, comments were entered on slips attached to the schedules, which were then returned to the enumerator for additional information. This was obtained by a revisit where necessary.

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[13] Twenty percent of the households were enumerated by professional persons (nearly half of whom were teachers); 10 percent by enumerators of the proprietor, manager, or official class, 15 percent by salesmen; 8 percent by accountants; 6 percent by real estate or insurance agents, 28 percent by persons in other clerical occupations; 9 percent by persons classified as nonwhite collar, and 3 percent by persons who had never been employed.

Thirty-seven percent of the households were enumerated by persons who had attended college, 95 percent by persons who had attended high school. Nearly two-thirds of the households were enumerated by persons between the ages of 25 and 45; 14 percent by persons under 25; and 23 percent by persons 45 and over (The above figures are based on a 0 5 percent random sample of the punched cards for the surveyed households)

[14] The individuals tentatively selected for assignment to the survey were introduced to it through a discussion of its purposes by the local supervisor. They were then sent home with an abbreviated instruction manual, 2 family narratives (i e , an imaginary interview), a schedule properly filled from one of the narratives, and a blank schedule to be filled from the other narrative. On the following day the home work was reviewed and the prospective enumerators were asked to fill a second schedule from a third narrative. Those who showed no aptitude for the work were returned to the employment service. Successful candidates were given additional training, were paired and required to fill schedules covering each other's families, and were required to attend a prepared dialogue showing how an interview should be conducted. Following this week of intensive training the canvassers were sent into the field to make trial enumerations. Further training was given to those who required it.

(6) The local supervisors were encouraged to write to the central office when any uncertainties as to the interpretation of the instructions arose. Questions were answered in the form of technical bulletins issued to the whole field staff or of special letters to the individual supervisors.

(7) The earliest schedules from each city were examined critically in the central office to determine whether incorrect forms of entry or inconsistencies were present which might indicate lack of understanding of field instructions. Questionable entries were discussed with the local office and in many cases schedules were returned to illustrate inacceptable entries.

(8) Throughout the survey all schedules were examined in the central office for major misinterpretations of the instructions, and the points were taken up through correspondence with the local offices.

Completeness of enumeration.—The support given the survey by the public is indicated by the fact that 98.5 percent of the families which were asked to give information complied with the request, which is as good an attainment as that reached by the last population census, if not a better one.

A check on the completeness of the enumerator's work was made through the use of a control card and a daily record book. Prior to the beginning of the canvass, workers were sent into the field to enter on a small card the address of every building that appeared to be usable for human habitation. These cards were filed in the local office, and later, as each schedule was received from the field, the address was checked against the file. Unoccupied buildings or dwelling units were identified in the enumerator's record book and upon the reported completion of each enumeration district the control clerk compared the unmatched cards with the record book entries. An investigation was made whenever a control card was not accounted for either by a schedule or by a record book entry.

Losses of certain types of persons under the survey definitions have been discussed in connection with the question of representativeness of the sample.

Another aspect of completeness concerns the record of cases of illness among canvassed persons. Exact enumeration of the fact and nature of illness presents much greater difficulties than does the recording of age, sex, and other information of the type obtained in the decennial censuses. Loss of some cases, even among those disabling for a week or more, is therefore inevitable.[15] At the present time, however, the house-to-house canvass, as stated previously, is the only method which is capable of yielding information of the type

[15] Studies of the informant-enumerator interview problem are being carried out by the Health Survey staff. One paper has already been presented on this subject (see Appendix C).

needed—the rates of serious illness and the medical care received in various population groups.[16]

Verification of diagnoses.—Enumerators requested the name of the physician who cared for any case of illness, or the hospital for hospitalized cases, and asked permission for the Public Health Service to obtain further medical information from these sources for statistical purposes. Such permission was granted almost without exception. A separate questionnaire, requesting confirmation or change of the diagnosis given by the family and certain supplementary information about the cases, was prepared for each of 13 groups of diagnoses, and was sent to the physician or hospital except in cases where permission was refused. Some 535,000 of these inquiries were mailed and about 400,000 (75 percent) were returned. The number of returned forms could have been increased to 500,000 or more had time and funds permitted a more thorough follow-up. Copies of the death certificates for fatal illnesses reported in the canvass were obtained from local registrars or State health departments in order that the cause of death as stated by the family might be compared with that on the official record.

Special comment is necessary as to the use made of the information received from physicians and hospitals and obtained from death certificates. Many of the illnesses and chronic diseases reported had no medical attendant during the year covered by the survey, and this fact precluded checking the diagnosis. In many instances the physicians did not return the forms, returned them too late for use, or were unable to identify the record.[17] For these and other reasons, medical information was available for only 26 percent of all diagnoses and 35 percent of illnesses disabling for a week and more. On the other hand, when the statements from the family and from the physician could be compared, an agreement of about 90 percent was found in terms of classifications of diagnoses into 15 to 30 groups (table 2).

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[16] It has been known since the U S census of 1850 that mortality data obtained in house-to-house canvasses are particularly subject to underenumeration Disappearance of single-person households, breaking up of other households, lack of coverage of orphanages, homes for the aged, and other institutions in which the death rates are particularly high, and the difficulty of establishing the concept of reporting on past members of the household, are some of the factors which result in abnormally low death rates. Since the fatal cases are a small proportion of the total, morbidity rates are not seriously affected by this tendency. Mortality rates based on survey data, on the other hand, are not useful except for special purposes.

[17] The last two of these reasons account for the difference between the percentage of forms returned (75) and the percentage on which a medical diagnosis was received (49) given in table 2

TABLE 2.—*Extent of agreement between family's and physician's statements of diagnosis*

Percentage of cases on which a medical report was received: [1]

All diagnoses [2]	26. 3
All illnesses disabling for a week or longer [3]	35. 5
Diagnosis for which a medical report was sent out [3]	49. 0

Percentage of matched cases,[4] showing agreement when diagnoses are classified into:

93 diagnosis groups	83. 3
28 diagnosis groups [5]	90. 4
15 diagnosis groups	91. 2
7 diagnosis groups	92. 9

[1] Based on 5 percent random sample of case cards, exclusive of orthopedic impairments, hernia, blindness, and deafness Queries were not sent to physicians for these diagnoses unless they caused disability.

[2] Sole, primary, and contributory diagnoses.

[3] Sole and primary diagnoses.

[4] Matched cases are diagnoses on which both the family's and physician's statements were available. Agreement means that the diagnoses from both sources fall into the same diagnosis group. Figures are based on tabulations for 10 large cities (Birmingham, Boston, Cleveland, Los Angeles, Minneapolis, New York, Portland, Oreg , St Louis, Salt Lake City, Syracuse).

[5] The percentage distribution according to these 28 diagnosis groups is shown below for matched cases and all others (illnesses disabling for a week or longer, sole or primary diagnoses):

	Matched cases	All others	Difference
All diagnoses	100 00	100 00	
Communicable diseases	13 83	15 83	+2 00
Common communicable diseases of childhood	12 36	14.62	+2 26
Other infectious and parasitic diseases	1 47	1 21	− 26
Cancer and tumors	2.24	1 78	− 46
Diabetes	.76	53	− 23
Rheumatism and allied diseases	3 56	3 60	+ 04
Cardiovascular-renal diseases	7 60	5 95	−1.65
Nervous and mental diseases	3 04	3 30	+ 26
Diseases of ear and mastoid process	1.69	1 13	−.56
Diseases of respiratory system	29 55	30 65	+1 10
Tuberculosis (including nonrespiratory)	.86	.78	−.08
Pneumonia (all forms)	3.51	2 49	−1.02
Tonsillitis (including tonsillectomies)	7 24	5.45	−1 79
Other	17.94	21 93	+3 99
Diseases of digestive system	8 72	7 84	−.88
Appendicitis (including appendectomies)	3 01	2 71	−.30
Hernia	.65	.58	−.07
Diseases of teeth, mouth, and gums	.29	27	−.02
Other	4 77	4 28	−.49
Diseases of thyroid gland	.41	.35	−.06
Anemia	.36	.27	−.09
Hemorrhoids	.45	.43	−.02
Varicose veins	.26	.24	−.02
Diseases of bladder and urinary passages and male genital organs	.90	.67	−.23
Diseases of female genital organs and complications of pregnancy	1 61	1.63	+.02
Confinements	8 80	9 07	+.27
Skin diseases	1 50	1 17	−.33
Accidents	9.80	9 63	−.17
Orthopedic impairments	1.02	1.81	+.79
Deafness and blindness	.10	.29	+.19
All other	3.82	3.83	+.01

It is evident that, if rates had been based solely on cases for which a medical report was received, the incidence would have been grossly understated. Furthermore, to have used the physician's reports where available and the family's reports in other cases would have been an inconsistent procedure. On the other hand, it is equally clear that in terms of any broad classification of disease causes, the family's reports in general coincide with the doctor's reports. For all these reasons, most articles in this series are based on reports given by the family, the information from the physician being used as a criterion of the validity of various diagnosis classifications and for special studies. The death certificate diagnoses will be used for intensive studies of fatal cases but, again for consistency, when the fatal and nonfatal illnesses are treated together, the diagnoses used will be taken from the family's report.

Coding, card punching, and tabulating.—Coding was done by workers from the relief rolls in a single central office under the immediate direction of a large group of coding supervisors.[18] The supervisors worked under the direction of Public Health Service personnel who had had from 10 to 20 years of experience with similar data. The data were placed on punch cards [19] and tabulated in the usual manner.[20]

COMPARISON OF COMPOSITION OF THE SURVEYED POPULATION WITH THAT SHOWN BY THE 1930 CENSUS

As pointed out, the population enumerated in this study constituted about 3.6 percent of the urban population of the United States (1930).[21] The methods employed in securing this sample have been described as well as the exclusions involved in the survey definitions. The composition of the surveyed population in comparison with that of the census urban population is of interest as indicating the degree to which the survey population may be taken as representing urban United

[18] Because of the large scale of coding operations, special precautions were necessary to assure accuracy and consistency. Such precautions included the employment of a large group of supervisors (see Appendix E for list of coding and tabulating supervisors); the employment of section chiefs in semisupervisory positions; the use of mimeographed or written instructions and code tables for all coding; the referral to supervisors of all problems that could not be handled routinely, the routine verification of all operations, including 2 or 3 verifications for the more difficult operations; the selection of the best workers for coding of medical information; and the use of a referral unit of physicians to assure assignment of diagnoses to the proper diagnosis groups (nonmedical coders assigned diagnosis code numbers only when the exact term could be found in the alphabetical index to the diagnosis code)

[19] In order to assure the greatest possible accuracy in preparing the punched cards from the coded data, a series of mechanical verification procedures was adopted for the punching operations Also, as a final precaution before the cards were used in tabulations, a check was made of about one-fifth of the items punched for each schedule so that possibility of internal discrepancy might be obviated. When a chance inconsistency was found, such as disagreement between the code representing the number of persons per family and the number of individual cards punched for that family, reference was made to the schedule and the error corrected. Equally careful verification and reverification methods were employed throughout the machine tabulation processes.

[20] The magnitude of these operations is indicated by administrative records Coding of the schedules required 13,000 man-months of work on the part of a staff that reached 1,000 persons at its peak Punched cards totalled 4,800,000. Tabulating of these cards required about 1,125 man-months.

[21] See Appendix C for Health Survey population by age, color, sex, and income and relief status of the family.

States, but changes between 1930 and the time of the survey (winter of 1935–36) are to be kept in mind.

Age.—Comparison of the age distribution of the population studied in this survey with that of the 1930 urban population is given in table 3. The two correspond quite closely, although there is some increase in the percentages at the older ages. The table includes a column giving the percentage distribution for the survey cities (1930 Census). Close agreement with the figures for the whole urban population is indicated.

TABLE 3.—*Percentage distribution by age of the 1930 Census urban population and the National Health Survey population*

Age (years)	Percentage distribution			Age (years)	Cumulative percentage		
	Health survey	1930 Census			Health survey	1930 Census	
		Urban U. S.	Survey cities [1]			Urban U. S.	Survey cities [1]
All ages	100.0	100.0	100.0	All ages	100.0	100.0	100.0
Under 5	7.0	8.2	8.0	5 and over	93.0	91.8	92.0
5–9	8.1	9.0	8.8	10 and over	84.9	82.8	83.2
10–14	9.0	8.6	8.4	15 and over	75.9	74.2	74.8
15–24	17.8	18.0	18.1	25 and over	58.0	56.1	56.6
25–34	17.0	17.3	17.8	35 and over	41.0	38.8	38.8
35–44	15.8	15.5	15.8	45 and over	25.1	23.2	23.0
45–54	12.1	11.2	11.3	55 and over	13.0	12.0	11.7
55–64	7.3	6.9	6.8	65 and over	5.7	5.1	4.9
65 and over	5.7	5.1	4.9				
Unknown age	0.2	0.1	0.1				

[1] For each sampled city the proportion of the 1930 population included was in accordance with the sampling ratio. (See p. 1666.)

Sex ratio.—There were 92.4 males for each 100 females in the Health Survey population. This is 5.7 below the sex ratio of 98.1 which obtained in the 1930 urban population. Part of the difference may be ascribed to a declining national sex ratio.

Color.—The percentage of individuals classified as colored in the Health Survey was 10.1, as against 8.9 in the Census of 1930 (urban).

Sex, age, and color.—In table 4 is shown the percentage distribution by sex, age, and color for the Health Survey population and for the 1930 Census (urban) population. Although certain discrepancies may be noted, partly due to changes between 1930 and 1935–36 and partly to exclusions of some transients under the survey definitions (see p. 1668), the table indicates that the survey sample was representative of urban United States as to age, sex, and color composition.

Size of household.—Distribution of the enumerated households by size shows general uniformity with the urban Census data for 1930 (table 5). "Households" in both instances include unrelated members.

Family income.—Comparison of the percentage distribution of families by income in the Health Survey cities with estimates arrived

at by the National Resources Committee [22] is given in table 6. The agreement is quite close.

TABLE 4.—*Percentage distribution of Health Survey population and 1930 urban population by sex, color, and age*

Color and age (years)	Percentage of persons					
	Both sexes		Male		Female	
	Health Survey	1930 urban	Health Survey	1930 urban	Health Survey	1930 urban
All colors:						
All ages	100 0	100.0	48.0	49.5	52.0	50.5
Under 5	7.0	8 2	3.6	4 1	3.5	4 0
5-9	8 1	9.0	4.1	4.5	4.0	4.5
10-14	9.0	8.6	4.5	4.3	4 5	4 3
15-24	17.8	18 0	8.3	8 6	9 6	9 5
25-34	17.0	17.3	7.9	8.5	9 1	8.8
35-44	15 8	15 5	7 6	7 9	8.2	7 6
45-54	12 1	11.2	6.1	5.7	6 1	5 5
55-64	7.3	6 9	3.5	3.4	3 8	3 5
65 and over	5.7	5 1	2.5	2.4	3 1	2.7
Unknown age	.2	.1	.1	.1	.1	(1)
White and unknown:						
All ages	89 9	91.1	43.4	45.2	46.5	45.9
Under 5	6.2	7.4	3.1	3 7	3.0	3.6
5-9	7.2	8.2	3.6	4.1	3.5	4 0
10-14	8.0	7 9	4 0	4.0	4.0	4 0
15-24	16 1	16 3	7 5	7.8	8 6	8 5
25-34	15 1	15 5	7.1	7 6	8.0	7.9
35-44	14 0	14 1	6 8	7 2	7 2	6.9
45-54	11.0	10 3	5 5	5.2	5.5	5 0
55-64	6.8	6.5	3 3	3 2	3 6	3 3
65 and over	5.3	4.9	2.4	2.3	3.0	2.6
Unknown age	.1	.1	(1)	(1)	.1	(1)
Colored						
All ages	10 1	8.9	4.7	4.3	5.4	4.5
Under 5	.9	.8	.4	.4	.4	.4
5-9	.9	.9	.5	.4	.5	.4
10-14	1.0	.7	.5	.3	.5	.4
15-24	1.7	1 7	.7	.8	1 0	.9
25-34	1.9	1.8	.8	.9	1 1	.9
35-44	1.8	1 4	.8	.7	.9	.7
45-54	1.1	.9	.5	.5	.5	.4
55-64	.5	.4	.2	.2	.2	.2
65 and over	.3	.2	.1	.1	.2	.1
Unknown age	(1)	(1)	(1)	(1)	(1)	(1)

1 Less than 0 05 percent.

TABLE 5.—*Percentage distribution of households by size, Health Survey and urban United States (1930)*

Number of persons per household	Health Survey [1]	1930 Census urban [2]	Number of persons per household	Health Survey [1]	1930 Census urban [2]
1	7.8	8.0	5	11.8	11.6
2	26.2	25.1	6-7	9.4	10.6
3	21 8	22.1	8+	3.7	4.3
4	19.4	18.1			

1 Based on 0.5 percent random sample of punched cards.
2 Excludes quasi-families.

22 Consumer Incomes in the United States. Their Distribution in 1935-36. National Resources Committee. Government Printing Office, Washington. 1938. Further discussion of correspondence of income data in the two studies will be found on p. 58 of that report.

The comparisons made in this section show general agreement between the make-up of the survey population and that of urban United States (1930).

TABLE 6.—*Percentage distribution of families by income,*[1] *Health Survey*[2] *and National Resources Committee*[3] *estimates*

Income	Health Survey	National Resources Committee estimates	Income	Health Survey	National Resources Committee estimates
All incomes	100.0	100.0	$1,000 to $2,000	37.3	35.3
			$2,000 to $3,000	10.8	11 2
Under $1,000	46.1	46.6	$3,000 and over	5.9	6.9

[1] Families with known income.
[2] All relief families classified with the group under $1,000
[3] From Consumer Incomes in the United States. Their Distribution in 1935–36. National Resources Committee, U. S. Government Printing Office, 1938. P. 6

TERMS AND DEFINITIONS

The meaning of terms used in articles reporting the Health Survey findings will, in general, be apparent from the schedule reproduced in Appendix A and from the tables and discussion contained in the various publications. For ready reference purposes, however, a few explanations and definitions are given below.

The study period.—The survey year is regarded as the 12 months preceding the day of the visit to any particular family.

Enumeration was started early in October 1935 and completed by March 30, 1936.[23] Hence, information was obtained in the survey on sickness experienced between October 1, 1934, and March 30, 1936. The worst phases of the depression had been passed but widespread unemployment and want still prevailed. In relation to the medical care reported by relief families, it should be noted that the Federal Emergency Relief Administration medical care plan was in operation in numerous cities throughout the Nation during 1934 and the first half of 1935.

Population base for illness rates.—Rates of prevalence on the day of the visit and of incidence over the study year are both based on the number of persons in the household at the time of the canvass. Persons born during the study year are, therefore, included in the population base, but not those dying during this period.[24] The illness record of both of these groups is, however, included. Persons in institutions for the care of disease during the entire study year are likewise excluded from the population, but included in the illness record insofar as data were obtained.[25] Exclusions from both population and illness records are listed on p. 1668.

[23] One percent of the schedules had been filled by November 30, 1935, 20 percent by December 31; 50 percent by January 31, 1936; and 95 percent by March 14.

[24] For certain purposes (for instance, illness rates for infants) this rule was modified.

[25] The use of a single population base for the several purposes of the survey was adopted for simplicity and because no appreciable error was introduced thereby. It may be observed that the inclusion of infants, who are thus assumed to be under observation for the whole survey year, tends to balance the exclusion of deaths.

Household, family.—One schedule was filled for each household or dwelling unit, i. e., for each group of persons or single person living in one abode or dwelling such as a house, apartment, rooming house, dormitory, nurses' home, or room or suite in a hotel. The "household" includes all persons who reside (sleep) in the abode, regardless of relationship. The term "family" applies to all persons in the household related to the head by blood, marriage, or adoption.

Relief status.—Families were identified as having received relief, if at any time during the survey year one or more members had had aid such as public assistance,[26] mothers' pension, pension for the blind, or a grant for any similar purpose from public funds administered by the Federal, State, or local government.

Family income.[27]—Income is defined to include all salaries, wages, business profits (including those received from boarding and lodging houses), income from boarders and lodgers in private families, and income from investments received during the survey year; it thus represents an approximate net yearly income for the family. Families were not asked to report the exact amount of income, but were asked to locate themselves in one of the classifications shown on the schedule. No allowances were made for income in kind.[28] If a household had been in existence for less than 1 year, the income was prorated on an annual basis. Families which reported the receipt of relief were not asked to specify the amount of income during the year. "Economic status" is used in the reports to cover the two items of income and relief. For the purpose of classifying persons by income, unrelated members of households (servants, roomers, etc.) are assigned to the income group corresponding to that of the family in which they live.

Occupational class.—A classification of usual occupation was made in conformity with the schedule developed by Dr. Alba M. Edwards of the Census Bureau. Comparability with Census data was attained by employing similar definitions in the enumeration and by coding the original occupation entries according to the Census code and instructions. The occupation entered on the schedule was the one which a person considered to be his usual occupation. Persons seeking their first jobs were recorded as having "no occupation."

Workers.—This term applies to (1) persons employed in private industry and in Government departments, (2) unemployed persons engaged on work relief, and (3) totally unemployed persons seeking work (including those looking for their first jobs). Persons reported to have a chronic disease or permanent impairment which prevented

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[26] Includes work relief against a relief budget and employment on work relief projects at security wages for persons taken from relief rolls.

[27] Income was also reported for the "economic unit" (i. e., a group sharing in a common income), but the reports are based on income as reported for the family.

[28] No effort was made to obtain real income for farm families.

them from working or from seeking work are not included among "workers." Employment status was reported as of the day of the visit.

Age.—Age is entered as of last birthday.

Sickness and impairment data.—The following definitions are of importance in interpreting the significance of the sickness and impairment data.

A disabling illness is considered an illness that keeps the person from his work, school, domestic duties, or other usual activities. A person unable to pursue usual activities by reason of disease, accident, or physical or mental impairment is regarded as having a disabling illness. Such illnesses may be due to one or more causes (diagnoses).

Disabling illnesses of 1 day or more were recorded providing the person was still unable to work on the day of the visit. For recovered cases, illnesses of 7 consecutive days or longer were recorded.[29] Classified with the latter for the purpose of the reports are all hospital cases and confinements which had disabled for less than 7 days. Fatal cases are included regardless of the duration of disability.

A second period of disability due to the same cause, occurring within 7 days of the termination of the first case, constituted a relapse. The duration of disability due to a relapse was added to the duration of the original illness.

Termination of disabling illness was recorded according to status of an illness on day of visit ("recovered," "still unable to work," "died"). "Recovered" means that the illness, the period of disability, had ended and that the person had become able to resume his usual activities; the term does not imply complete recovery.

Diagnosis signifies the nature of an illness. One illness may have more than one diagnosis. If there is only one, it is termed "sole"; if there are two or more, one is termed "primary" and the others "contributory." [30] The primary diagnosis is that which had been associated with the disability for the longest period; or, if a separate period of disability was not specified for any diagnosis, the primary diagnosis is the one which was regarded by the family as the most important cause of the disability.

"Chronic" and *"acute"* constitute classifications set up for broad comparisons. Where tabulations are by detailed diagnosis, such classification is based on the nature of the diagnosis. Otherwise, the distribution is made on the basis of the duration of the symptoms. If the symptoms had been observed for 3 months or more, the disease was classified as "chronic"; if not, as "acute."

Unemployables are persons reported by the informant to have a chronic disease or permanent impairment which prevented them from

---

[29] Annual rates of frequency of illnesses disabling for a week or longer include those in which the disability began prior to the study year, but the rates of disability (days per case or per person) are based on disability occurring within the study year.

[30] When one of two diagnoses was merely a symptom of the other, the symptom was disregarded in coding.

(Serial No.) (Do Not Write Here)

1. FAMILY NAME .... 2. ADDRESS .... APT. No. .... 3. CITY .... 4. STATE ....

UNITED STATES PUBLIC HEALTH SERVICE

HEALTH SURVEY

ALL INFORMATION IS STRICTLY CONFIDENTIAL

TO BE USED FOR STATISTICAL PURPOSES ONLY

District ....

ROSTER (Members of Household)		Relation to Head of Household	Age	Sex	Marital Status	Came into Household in Last 12 Months	Country of Birth	Color	Education	Employment Status	Usual Employment		Member Industrial Sick Benefit	Veteran (Male, 30 or over)	For Persons Under 25			
															Smallpox		Diphtheria	
Person's No.	Name										Occupation	Industry			Case Age	Last Vaccination Age	Case Age	Immunization Age
5	6	7	8	9	10	11*	12	13	14	15	16	17	18*	19*	20	21	22	23
	(Given) (Last)																	
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		

DISABLING ILLNESSES*

ENTER: (a) Illness today.
(b) Illness—7 days or longer—past 12 months—include all hospital cases and all confinements.
(c) Hospital, etc., now—add to roster.
(d) Deaths—Past 12 months—add to roster.
(SEPARATE line for EACH illness for EACH person)

Person's No.	Given Name	Nature of Illness or Accident	Month and Year of Onset of This Disabling Illness	Time Unable to Work or Pursue Usual Activity—Last 12 Months Only			Operation—Past 12 Months	Compensation Paid or Claimed—Past 12 Months	Termination (For Deaths, Enter Month and Year)	Doctor: Number of Calls Past 12 Months		Name and Address of Doctor, Hospital, Etc.	Doctor Within 1 Mile	Nurse		Previous Attacks of Same Disease		
				In Hospital	In Bed but Not in Hospital	Not in Bed				At Home	To Office or Clinic			Number of Days Past 12 Months	Number of Visits Past 12 Months	Any?	How Long Ago Was Ailment First Noticed	Doctor Past 12 Months for Previous Attack
24	25	26	27	28	29	30	31*	32*	33	34	35	36	37*	38	39	40*	41	42*

18a .... (Name and address of sick benefit association) 19a .... (What war?) 19b .... (Rank) 19c .... (Pension or compensation ever received*) 33a .... (Place of death)

*Means entry (if required) should be Yes, No, or Unk.

2—17096

NOTES:

170189°—39 (Face p. 1679)

OTHER HANDICAPPING DISEASE OR CONDITION

(Ask if any member of household has any other handicapping disease or condition (in addition to any recorded in cols. 24–42) referring to each of following as suggestive of the kind of thing meant. Enter person's number or numbers having case, check off as asked, if none. Record below facts for each case. Nature of disease to be entered as described by informant.)

Asthma		Epileptic attacks, fits		Neuritis, neuralgia	
Bright's disease, nephritis		Goiter		Rheumatism, arthritis	
Bronchitis		Hay fever		Tuberculosis	
Cancer		Heart disease		Tumors	
Diabetes		Hemorrhoids		Varicose veins	
Digestive disorder		High blood pressure		Any other chronic disease	

Nature of Disease (Informant's statement) 43	Person's No 44	Given Name 45	Doctor Seen in Past 12 Months 46*	Name and Address of Doctor, Hospital, Etc. 47	Doctor Within 1 Mile 48*	How Long Ago First Noticed 49	Interferes With Job 50*	Estimated Time Lost Past 12 Months 51
			47a (Parts affected)	47b (Cause)	47c (Appliance)			
Loss of leg, arm, finger, etc.								
Crippled, deformed, paralyzed								
Hernia (rupture)			(Site)					
Deaf			(Total)*	(Partial)*	(Deaf-mute)*			
Blind			(Both eyes)*	(One eye)*	(Partial)*			

* Means entry (if required) should be Yes, No, or Unk.

NOTES:

52. Has anyone in this home ever been examined for tuberculosis? * ______ or been in a tuberculosis sanatorium? * ______

(Years ago)	(No.)	(Given name)	(Name and address of doctor, clinic, or sanatorium)

53. Has anyone in this home been to a health clinic or health center in past 12 months? * ______

(No.)	(Given name)	(Name and address of agency)

54. Has a nurse from any agency made any visits to this home in past 12 months? * ______

(For what purpose?)	(Name and address of agency (or nurse))

55. (a) Number of years household has been established ______
(b) Number of years in this house ______
(c) Number of years in this city ______
(d) Number of moves from one locality to another in last 10 years ______
(e) Moved from farm within last 10 years? * ______

56. (a) House or apartment? ______
(b) If renting, monthly rental — Now ______ 1929 ______
(c) If owned, value now ______
(d) Number of rooms ______

57. Water (check): City ______ Other ______

58. Toilet (check)

	Private	Communal
Flush inside		
Flush outside		
Other		

59. Estimated Total Family Income for Last 12 Months

	(Check)
$5,000 or more	
$3,000 but under $5,000	
$2,000 but under $3,000	
$1,500 but under $2,000	
$1,000 but under $1,500	
Less than $1,000	

60. Was relief received in past 12 months? * ______
(Name and address of agency)

61. Degree of cooperation (check): Good ______ Fair ______ Poor ______

62. Date of visit ______ **63.** ______ (Person's number and name of informant)

64. Enumerator ______

(Do not write in this space)

working or seeking work. The subjective nature of this criterion is recognized.

Invalidism is considered continuous disability for a period of 12 months prior to the day of the visit. The inclusion of some persons not *permanently* disabled is balanced, to some extent at least, by the exclusion of persons becoming permanently disabled during the study year.

Impairments are permanent handicaps resulting from disease, accident, or congenital defect, including impaired or lost members (termed orthopedic impairments), and serious defects of vision or hearing. Impairments may be either disabling or nondisabling.

Physicians' care is attention received from a doctor of medicine, including care in home, office, clinic, or outpatient department, but excluding care in a hospital. The case receiving such care may or may not have been a hospital case.

A hospital case is a case which was confined to a hospital for 24 hours or longer. "Hospital" includes any institution for the care of physical or mental disease.

Private duty nursing care is considered to be bedside care by a full-time nurse, including care by special nurses in hospital, but not nursing service rendered by the hospital without special charge. Where the patient was attended by both day and night nurses, 2 days of care were recorded for each attended day. No attempt was made to distinguish between registered and nonregistered nurses.

Nursing visits are visits by nurses from any agency, including service from private duty nurses secured on an hourly basis.

These definitions agree with those set up for the enumerators, but the point should be made that, despite all efforts to lay down and employ exact definitions, the interpretation of these terms tends to vary somewhat with the enumerator and the informant.

FINDINGS

There have already been published a series of bulletins, listed in Appendix D, giving preliminary findings of the survey. It is now intended to report the results of the survey in considerable detail in a number of articles to be published in the PUBLIC HEALTH REPORTS or as special monographs. Subjects of reports to be issued in the near future include: Broad results, illness and medical care in special age groups (children, youths, aged); illness and disability in relation to economic status, unemployment, and dependency; disability among male and female workers; frequency of accidents (home, public, and occupational), and specifically of automobile accidents; prevalence and causes of orthopedic impairments; degree of adequacy of maternal services; housing conditions and sanitary facilities.

Appendix B

The 83 Health Survey cities arranged according to region, city size group, and State, together with the number of households enumerated in each

CITIES OF 500,000 OR MORE POPULATION [1]

Northeast		North Central		South		West	
City	Households enumerated	City	Households enumerated	City	Households enumerated	City	Households enumerated
Boston, Mass.	29,808	Chicago, Ill.	38,501	(2)		Los Angeles, Calif.	26,297
Buffalo, N. Y.	24,055	Detroit, Mich.	21,389				
New York, N. Y.	48,281	St. Louis, Mo.	24,116				
Philadelphia, Pa.	32,360	Cleveland, Ohio	31,993				
Pittsburgh, Pa.	20,391	Total	115,999				
Total	154,895						

CITIES OF 100,000 TO 500,000 [1]

Northeast		North Central		South		West	
City	Households enumerated	City	Households enumerated	City	Households enumerated	City	Households enumerated
Fall River, Mass.	10,481	Flint, Mich.	4,826	Birmingham, Ala.	11,172	Oakland, Calif.	8,361
Newark, N. J.	13,999	Grand Rapids, Mich.	5,112	Atlanta, Ga.	10,737	Portland, Oreg.	10,329
Trenton, N. J.	7,580	Minneapolis, Minn.	12,295	New Orleans, La.	13,192	Salt Lake City, Utah	7,775
Syracuse, N. Y.	12,827	Cincinnati, Ohio	12,549	Dallas, Tex.	10,398	Seattle, Wash.	9,724
Total	44,887	St. Paul, Minn.	12,809	Houston, Tex.	11,738	Spokane, Wash.	8,127
		Columbus, Ohio	11,058	Richmond, Va.	12,542	Total	44,316
		Total	58,739	Total	70,279		

CITIES OF 25,000 TO 100,000 [3]

Northeast		North Central		South		West	
City	Households enumerated	City	Households enumerated	City	Households enumerated	City	Households enumerated
Pittsfield, Mass.	11,951	Port Huron, Mich.	8,295	Montgomery, Ala.[1]	9,742	Salem, Oreg.	8,142
Lebanon, Pa.	6,412	Springfield, Mo.	16,650	Monroe, La.	6,985		
Total	18,363	Lima, Ohio	11,283	Amarillo, Tex.	11,091		
		Total	36,228	Wichita Falls, Tex.	10,793		
				Total	38,611		

CITIES OF LESS THAN 25,000 [3]

Greenfield, Mass.	4,045	Benton, Ill.	2,107	Eufala, Ala.	1,412	Chico, Calif.	2,539
Ipswich, Mass.	1,448	Normal Ill.	1,749	Gadsden, Ala.	5,525	Grass Valley, Calif.	1,507
Bridgeton, N. J.	4,419	Houghton, Mich.	991	Greenville, Ala.	1,048	Jackson, Calif.	683
Lambertville, N. J.	1,100	Chisholm, Minn.	1,778	Brunswick, Ga.	3,094	Napa, Calif.	1,812
Somerville, N. J.	2,106	Wilmar, Minn.	1,799	Abbeville, La.	1,373	Vallejo, Calif.	4,626
Hudson, N. Y.	3,185	Winona, Minn.	6,426	Bossier, La.	917	LaGrande, Oreg.	2,264
Newark, N. Y.	1,861	Chillicothe, Mo.	2,135	Minden, La.	1,401	St Helens, Oreg.	1,279
Penn Yan, N. Y.	1,514	Clinton, Mo.	1,646	Weatherford, Tex.	1,497	Bingham Canyon, Utah	905
Duryea, Pa.	1,729	Franklin, Ohio	1,088	Covington, Va.	1,501	Eureka, Utah	651
Indiana, Pa.	2,490	Wilmington, Ohio	1,499	Farmville, Va.	857	Tooele, Utah	1,143
						Ellensburg, Wash.	1,466
Total	23,897	Total	21,218	Total	18,625	Olympia, Wash.	3,721
						Total	22,596
Total	242,042		232,184		163,741		101,351

[1] Sampled. The approximate proportions of the population covered are as follows Atlanta, one-seventh; Baltimore, special sampling procedure, Birmingham, one-sixth; Boston, one-seventh, Buffalo, one-sixth, Chicago, one-twenty-fourth, Cincinnati, one-tenth; Cleveland, one-seventh, Columbus, one-eighth, Dallas, one-seventh, Detroit, one-nineteenth, Fall River, one-third, Flint, one-eighth, Grand Rapids, one-ninth, Houston, one-eighth; Los Angeles, one-eighteenth, Minneapolis, one-eleventh, Montgomery, one-half; Newark, N. J., one-eighth, New York City, one-thirty-eighth, New Orleans, one-ninth; Oakland, one-eleventh, Philadelphia, one-fifteenth, Pittsburgh, one-eighth, Portland, one-ninth; Richmond, one-fourth, St. Louis, one-ninth, St Paul, one-seventh, Salt Lake City, one-fifth, Seattle, one-tenth; Spokane, one-fourth; Syracuse, one-fifth; Trenton, one-fourth.

[2] Baltimore is the only city of this size in the South. The eastern and western health districts of this city were included in the survey for a special purpose, but since this method of sampling did not give a representative cross section of the city, Baltimore is excluded from the general reports. As this city was the only one canvassed in Maryland, its exclusion reduced to 18 the number of States on which these reports are based.

[3] Completely canvassed.

Appendix C

Population surveyed in urban areas, classified by age, color, sex, and annual income and relief status of the family

Color, sex, annual family income and relief status	Number of persons										
	All ages	Under 5 years	5-9 years	10-14 years	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65 years and over	Unknown age
All colors											
Both sexes:											
All incomes	2,502,391	175,653	202,770	224,391	446,369	425,301	395,525	303,008	182,754	142,409	4,211
Relief	452,897	46,431	53,059	57,126	83,038	59,568	59,858	45,625	25,872	22,087	233
Nonrelief under $1,000	577,678	39,943	42,974	47,388	102,079	97,256	86,423	67,325	47,515	45,815	960
$1,000 to $1,500	538,210	39,739	44,423	47,021	93,358	101,795	87,426	62,042	35,860	26,002	544
$1,500 to $2,000	394,351	24,558	29,538	33,332	68,418	72,905	69,195	50,429	27,525	18,001	450
$2,000 to $3,000	279,063	14,661	18,794	22,037	48,768	50,345	50,460	38,568	21,440	13,588	402
$3,000 to $5,000	110,312	4,671	6,324	7,899	19,924	18,778	19,393	16,921	10,047	6,153	202
$5,000 and over	50,278	1,754	2,696	3,355	8,455	7,900	8,642	8,316	5,367	3,606	187
Unknown income	99,602	3,896	4,962	6,233	22,329	16,754	14,128	13,782	9,128	7,157	1,233
Male:											
All incomes	1,201,992	89,214	101,917	112,076	206,696	196,845	191,157	151,540	87,647	63,636	1,264
Relief	222,033	23,540	26,575	28,500	40,437	27,529	28,031	23,325	13,264	10,724	108
Nonrelief under $1,000	270,373	20,407	21,443	23,512	45,927	44,883	41,038	32,205	21,004	19,639	315
$1,000 to $1,500	261,557	20,117	22,549	23,590	42,777	48,429	43,797	31,499	17,107	11,507	185
$1,500 to $2,000	191,900	12,539	14,830	16,533	32,346	33,859	34,363	25,909	13,465	7,952	104
$2,000 to $3,000	135,254	7,430	9,417	11,137	23,120	22,804	24,718	19,662	10,756	6,098	112
$3,000 to $5,000	52,857	2,336	3,285	3,976	9,177	8,425	9,074	8,500	5,143	2,882	59
$5,000 and over	22,723	884	1,331	1,725	3,563	3,125	3,728	3,944	2,671	1,709	43
Unknown income	45,295	1,961	2,487	3,103	9,349	7,791	6,408	6,496	4,237	3,125	338
Female											
All incomes	1,300,399	86,439	100,853	112,315	239,673	228,456	204,368	151,468	95,107	78,773	2,947
Relief	230,864	22,891	26,484	28,626	42,601	32,039	31,827	22,300	12,608	11,363	125
Nonrelief under $1,000	307,305	19,536	21,531	23,876	56,152	52,373	45,385	35,120	26,511	26,176	645
$1,000 to $1,500	276,653	19,622	21,874	23,431	50,581	53,366	43,629	30,543	18,753	14,495	359
$1,500 to $2,000	202,451	12,019	14,708	16,799	36,072	39,046	34,832	24,520	14,060	10,049	346
$2,000 to $3,000	143,809	7,231	9,377	10,900	25,648	27,541	25,742	18,906	10,684	7,490	290
$3,000 to $5,000	57,455	2,335	3,039	3,923	10,747	10,353	10,319	8,421	4,904	3,271	143
$5,000 and over	27,555	870	1,365	1,630	4,892	4,775	4,914	4,372	2,696	1,897	144
Unknown income	54,307	1,935	2,475	3,130	12,980	8,963	7,720	7,286	4,891	4,032	895
White											
Both sexes:											
All incomes	2,249,995	154,150	178,999	199,812	403,300	377,455	351,521	276,313	170,907	133,854	3,684
Relief	359,285	36,164	41,816	45,886	67,527	45,352	45,672	36,535	21,634	18,598	101
Nonrelief under $1,000	463,631	31,361	33,718	37,740	82,220	72,880	65,455	55,300	42,220	42,037	700

$1,000 to $1,500	511, 693	38, 011	42, 298	44, 673	89, 006	96, 413	82, 131	58, 833	34, 540	25, 306	482
$1,500 to $2,000	386, 052	24, 135	28, 975	32, 591	67, 002	71, 242	67, 547	49, 318	27, 063	17, 750	429
$2,000 to $3,000	275, 691	14, 472	18, 562	21, 766	48, 186	49, 612	49, 835	38, 138	21, 240	13, 491	389
$3,000 to $5,000	109, 450	4, 651	6, 297	7, 873	19, 730	18, 557	19, 215	16, 803	9, 995	6, 129	200
$5,000 and over	49, 426	1, 742	2, 688	3, 348	8, 320	7, 625	8, 417	8, 196	5, 320	3, 584	186
Unknown income	94, 767	3, 614	4, 645	5, 935	21, 309	15, 774	13, 249	13, 190	8, 895	6, 959	197
Male:											
All incomes	1, 085, 400	78, 267	90, 241	100, 144	188, 582	176, 610	170, 610	138, 194	81, 843	59, 886	023
Relief	178, 966	18, 347	21, 125	23, 042	33, 588	21, 733	21, 753	18, 950	11, 236	9, 156	36
Nonrelief under $1,000	218, 273	16, 024	16, 881	18, 853	37, 948	34, 512	31, 176	26, 199	18, 483	17, 990	207
$1,000 to $1,500	248, 544	19, 220	21, 435	22, 441	40, 826	46, 040	41, 068	29, 739	16, 378	11, 221	156
$1,500 to $2,000	187, 803	12, 314	14, 552	16, 149	31, 706	33, 104	33, 523	25, 309	13, 206	7, 842	98
$2,000 to $3,000	133, 663	7, 340	9, 298	11, 011	22, 891	22, 478	24, 393	19, 443	10, 641	6, 060	108
$3,000 to $5,000	52, 567	2, 330	3, 275	3, 969	9, 120	8, 355	9, 012	8, 453	5, 126	2, 869	58
$5,000 and over	22, 470	879	1, 330	1, 723	3, 532	3, 039	3, 660	3, 909	2, 653	1, 703	42
Unknown income	43, 114	1, 813	2, 325	2, 956	8, 971	7, 349	6, 025	6, 192	4, 120	3, 045	318
Female:											
All incomes	1, 164, 595	75, 883	88, 758	99, 668	214, 718	200, 845	180, 911	138, 119	89, 064	73, 968	661
Relief	180, 319	17, 817	20, 691	22, 844	33, 939	23, 619	23, 919	17, 585	10, 398	9, 442	65
Nonrelief under $1,000	245, 358	15, 337	16, 837	18, 887	44, 272	38, 368	34, 279	29, 101	23, 737	24, 047	493
$1,000 to $1,500	263, 149	18, 791	20, 843	22, 232	48, 180	50, 373	41, 063	29, 094	18, 162	14, 085	326
$1,500 to $2,000	198, 249	11, 821	14, 423	16, 442	35, 296	38, 138	34, 024	24, 009	13, 857	9, 908	331
$2,000 to $3,000	142, 028	7, 132	9, 264	10, 755	25, 295	27, 134	25, 442	18, 695	10, 599	7, 431	281
$3,000 to $5,000	56, 883	2, 321	3, 022	3, 904	10, 610	10, 202	10, 203	8, 350	4, 869	3, 260	142
$5,000 and over	26, 956	863	1, 358	1, 625	4, 788	4, 586	4, 757	4, 287	2, 667	1, 881	144
Unknown income	51, 653	1, 801	2, 320	2, 979	12, 338	8, 425	7, 224	6, 998	4, 775	3, 914	879
Colored											
Both sexes:											
All incomes	252, 396	21, 503	23, 771	24, 579	43, 069	47, 846	44, 004	26, 695	11, 847	8, 555	527
Relief	93, 612	10, 267	11, 243	11, 240	15, 511	14, 216	14, 186	9, 090	4, 238	3, 489	132
Nonrelief under $1,000	114, 047	8, 582	9, 256	9, 648	19, 859	24, 376	20, 968	12, 025	5, 295	3, 778	260
$1,000 to $1,500	26, 517	1, 728	2, 125	2, 348	4, 352	5, 382	5, 295	3, 209	1, 320	696	62
$1,500 to $2,000	8, 299	423	563	741	1, 416	1, 663	1, 648	1, 111	462	251	21
$2,000 to $3,000	3, 372	189	232	271	582	733	625	430	200	97	13
$3,000 to $5,000	862	20	27	26	194	221	178	118	52	24	2
$5,000 and over	852	12	8	7	135	275	225	120	47	22	1
Unknown income	4, 835	282	317	298	1, 020	980	879	592	233	198	36
Male:											
All incomes	116, 592	10, 947	11, 676	11, 932	18, 114	20, 235	20, 547	13, 346	5, 804	3, 750	241
Relief	43, 067	5, 193	5, 450	5, 458	6, 849	5, 796	6, 278	4, 375	2, 028	1, 568	72
Nonrelief under $1,000	52, 100	4, 383	4, 562	4, 659	7, 979	10, 371	9, 862	6, 006	2, 521	1, 649	108
$1,000 to $1,500	13, 013	897	1, 094	1, 149	1, 951	2, 389	2, 729	1, 760	729	286	29
$1,500 to $2,000	4, 097	225	278	384	640	755	840	600	259	110	6
$2,000 to $3,000	1, 591	90	119	126	229	326	325	219	115	38	4
$3,000 to $5,000	290	6	10	7	57	70	62	47	17	13	1
$5,000 and over	253	5	1	2	31	86	68	35	18	6	1
Unknown income	2, 181	148	162	147	378	442	383	304	117	80	20

Population surveyed in urban areas, classified by age, color, sex, and annual income and relief status of the family—Continued

Color, sex, annual family income and relief status	Number of persons										
	All ages	Under 5 years	5–9 years	10–14 years	15–24 years	25–34 years	35–44 years	45–54 years	55–64 years	65 years and over	Unknown age
Colored—Continued											
Female.											
All incomes	135, 804	10, 556	12, 095	12, 647	24, 955	27, 611	23, 457	13, 349	6, 043	4, 805	286
Relief	50, 545	5, 074	5, 793	5, 782	8, 662	8, 420	7, 908	4, 715	2, 210	1, 921	60
Nonrelief under $1,000	61 947	4, 199	4, 694	4, 989	11, 880	14, 005	11, 106	6, 019	2, 774	2, 129	152
$1,000 to $1,500	13, 504	831	1, 031	1, 199	2, 401	2, 993	2, 566	1, 449	591	410	33
$1,500 to $2,000	4, 202	198	285	357	776	908	808	511	203	141	15
$2,000 to $3,000	1, 781	99	113	145	353	407	300	211	85	59	9
$3,000 to $5,000	572	14	17	19	137	151	116	71	35	11	1
$5,000 and over	599	7	7	5	104	189	157	85	29	16	----
Unknown income	2, 654	134	155	151	642	538	496	288	116	118	16

Appendix D

LIST OF PRELIMINARY RELEASES

DIVISION OF PUBLIC HEALTH METHODS, NATIONAL INSTITUTE OF HEALTH, UNITED STATES PUBLIC HEALTH SERVICE, WASHINGTON, 1938

Introductory Bulletin

Significance, scope, and method of a Nation-wide family canvass of sickness in relation to its social and economic setting.

Sickness and Medical Care Series

Bulletin 1. An estimate of the amount of disabling illness in the country as a whole.
Bulletin 2. Illness and medical care in relation to economic status.
Bulletin 3. Accidents as a cause of disability.
Bulletin 4. The prevalence and causes of orthopedic impairments.
Bulletin 5. Adequacy of urban housing in the United States as measured by degree of crowding and type of sanitary facilities.
Bulletin 6. The magnitude of the chronic disease problem in the United States.
Bulletin 7. Illness among employed and unemployed workers.
Bulletin 8. Maternal care in Michigan—a study of obstetric practices.
Bulletin 9. Disability from specific causes in relation to economic status.
Bulletin 10. Blindness—amount, causes, and relation to certain social factors.
Bulletin 11. Pneumonia in urban United States: Frequency, severity, and medical care.

Population Series

Bulletin A. Families distributed by income during the survey year.
Bulletin B. Families classified by occupational class of the head.
Bulletin C. The relief and income status of the urban population of the United States, 1935.
Bulletin D. Characteristics of the urban unemployed.
Bulletin E. Color, sex, and age of the population enumerated.

Hearing Study Series

Bulletin 1. Significance, scope, and method of a clinical investigation of hearing in the general population.
Bulletin 2. Preliminary analysis of audiometric data in relation to clinical history of impaired hearing.
Bulletin 3 Prevalence of aural pathology and clinical history of impaired hearing among males and females of various ages.
Bulletin 4. Normal hearing by air and bone conduction.
Bulletin 5. Normal hearing for speech at each decade of life.
Bulletin 6. Sex differences and age variations in hearing loss in relation to stage of deafness.
Bulletin 7. Generalized age and sex trends in hearing loss.

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Britten, Rollo H.: Housing and health. Am. J. Pub. Health, **28**:8 (1938).
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Dean, Archibald S., and Haenszel, William M.: Milk consumption in Buffalo. Supplement to Statistical Survey, March 1938. University of Buffalo, Bureau of Business and Social Research, Buffalo, New York. (Data for this study were collected on a supplemental schedule at the time of the Health Survey.)
Goddard, Jennie C., and Palmer, Carroll E.: Maternal services in Michigan with special reference to economic status. Pub. Health Rep., **54**:825–840 (1939).
Holland, Dorothy F., and Perrott, G. St. J.: Health of the Negro. Milbank Memorial Fund Quarterly, **16**:5–38 (1938).
Kiser, Clyde V.: Birth rates and socio-economic attributes in 1935. Milbank Memorial Fund Quarterly, **17**:446–459 (1939).

Kiser, Clyde V.: Variations in birth rates according to occupational status, family income, and educational attainment. Milbank Memorial Fund Quarterly, **16**:39–56 (1938).

Lienau, C. C.: The enumerator factor in the Health Survey. An address before American Statistical Association, December 28, 1938 (mimeographed).

Mountin, Joseph W., and O'Hara, Hazel: Differences in opportunities for health. Pub. Health Rep., **53**:485–496 (1938). Reprint No. 1920.

Parran, Thomas: The relationship of maternal and child health to the general health program. An address before the Children's Bureau Conference, January 17, 1938, Washington, D. C. (mimeographed).

Perrott, G. St. J.: Chronic illness in New York City—a report by its citizens. An address before the New York City Welfare Council, May 1938 (mimeographed).

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Perrott, G. St. J., and Holland, Dorothy F.: Health as an element in social security. Annals of the American Academy of Political and Social Science, **202**:116–136 (1939).

Roche, Josephine: Medical care as a public health function. Am. J. Pub. Health, **27**:1221–1226 (1937).

Tibbitts, Clark: What do we know about health in a depression? Read before Detroit Regional Conference of Social Workers, May 6, 1938 (mimeographed).

United States Senate: Illness and medical care among the unemployed. Statement by Surgeon General Thomas Parran, United States Public Health Service, and detailed report submitted to the Special Senate Committee to Investigate Unemployment and Relief, March 16, 1938. (Hearings pursuant to S Res. 36.)

Appendix E

NATIONAL HEALTH SURVEY STAFF [1]

George St. J. Perrott, *Project Director*
Clark Tibbitts, *Field Director*
Rollo H. Britten, *in Charge of Analysis*

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Fitzgerald, James S.	Lienau, Carl C.	Revell, Kenneth W.
Goddard, Jennie C.	Luykx, H. M. C.	Seeley, Burton D.
Hailman, David E.	McPherson, James L.	Shannon, Robert D.
Holland, Dorothy F.	Ogburn, Howard R.	

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Beckham, T. Ashby	Hayes, Grant	Scheer, Michael J.
Billows, Owen C.	Huffman, Ruby	Socha, Edmund S., M. D.
Block, Louis	Kamin, Louis E., M. D.	Taff, Melville A., Jr.
Cheney, Bess A.	Kaplan, Mae P.	Welch, Lily V.
Cohen, Zeldon S.		

[1] Acknowledgment is also made to the other members of the staff and to the 150 State and local supervisors, whose names it has not been possible to give for lack of space.

ADMINISTRATIVE CHIEFS

Andrews, James A.	Duerr, W. Ludwig	McPherson, James L.
Balderston, Wm. S.	Dutton, Lillian B.	Ogburn, Howard R.
Brown, J. E.	McGill, Kenneth H.	

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Collins, Selwyn D.	Palmer, Carroll E., M. D.	Stouffer, Samuel A.
Falk, I. S.	Reed, Lowell J.	Sydenstricker, Edgar
Fletcher, Harvey	Sasuly, Max	Thurstone, Louis L.
Frost, Wade, M. D.	Sinai, Nathan	Wiehl, Dorothy G.
Hoge, V. M., M. D.		

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Beasley, Willis C.	Klem, Margaret C.	Morrison, Elizabeth K.
Hailman, David E.	McGill, Kenneth H.	Steep, Miriam
Hedrich, A. W.		

TWO NEW SPECIES OF *OPISOCROSTIS* (SIPHONAPTERA)[1]

By NEWELL E. GOOD, *Associate Entomologist*, and FRANK M. PRINCE, *Assistant Entomologist, United States Public Health Service*

During the course of investigations on the distribution of plague in the western United States by the United States Public Health Service Plague Laboratory, two undescribed species of fleas of the genus *Opisocrostis* Jordan were encountered on ground squirrels from several localities in Oregon, Washington, and Idaho, and are described in this paper.

Opisocrostis oregonensis, new species

(Figures 1 and 2)

Male and female.—Color light amber, abdominal tergites somewhat darker.

Frontal tubercle distinct, only slightly less prominent than in *O. tuberculatus* (Baker). Preantennal region of head with the frontal row of bristles having only one small bristle near the front margin, even this sometimes degenerate. In the ocular row there are three bristles, the first large, the second quite small, and the third, on the lower anterior margin of the gena, large. Several small setae are interspersed between the bristles in this row. Eyes, postantennal region, and posterior margin of head as in *O. labis* (Jord. and Roths). Labial palpi five jointed; shorter than in *O. tuberculatus* and *O. labis*, reaching only slightly (0.0 to 0.08 mm.) beyond the apex of the fore trochanter in the female, and from the middle of the fore trochanter to slightly beyond the base of the fore femur in the male.

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[1] From the Plague Suppressive Measures Laboratory, San Francisco, Calif.

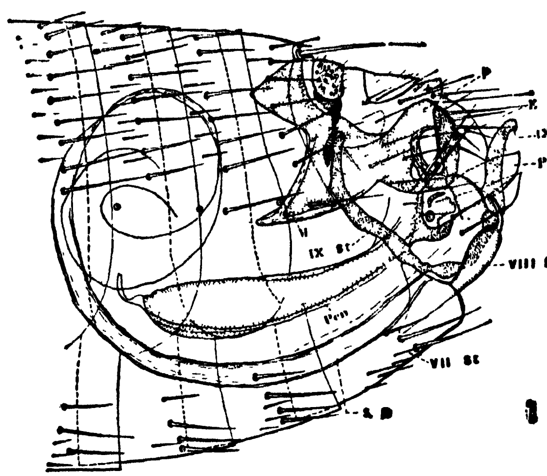

FIGURE 1.—*Opisocrostis oregonensis* new species, posterior abdominal segments of male. ×66.

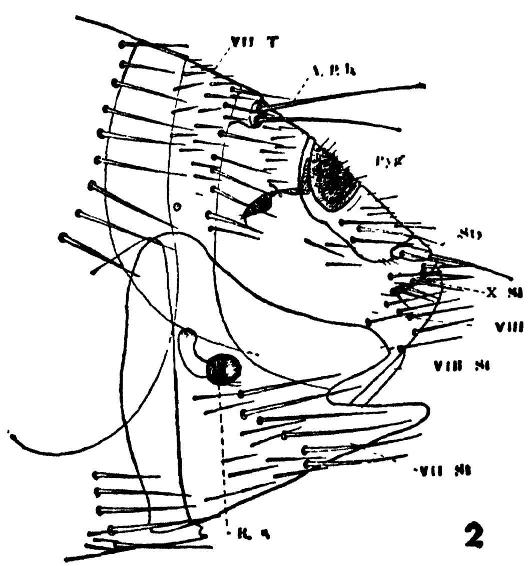

FIGURE 2.—*Opisocrostis oregonensis* new species, posterior abdominal segments of female. ×74.

Abbreviations.—A. p. b., antepygidial bristles; Ac., acetabulum and acetabular bristles; E, exopodite of clasper; M, manubrium of clasper; P, process of clasper; Par, parameres; Pen., penis; Pyg., pygidium; R. s., receptaculum seminis (spermatheca); S. p., spring of penis; St., sternite; Sti., stigma; Sty., stylet; T., tergite.

The pronotal ctenidium has a total of 19 to 21 spines. Apical spines, on each side, metanotum 4 or 5; abdominal tergites I and II, 2 each, rarely 3 or 1; abdominal tergite III, 1, rarely 2. Abdominal tergites II to VII each with 2 rows of bristles. On each side the principal row contains 8 to 10 long bristles interspersed with setae while the anterior row contains 7 to 9 smaller bristles. Bristles of abdominal sternites: Basal 4 to 11, average 7 in the female, and 2 to 7 in the male. On sternites III to VII the principal row contains, in the female 5 or 6, sometimes 7, and in the male 3 or 4, rarely 5, long bristles, anterior to which there are several small bristles arranged irregularly. The number of these ranges, in the female, from about 3 on sternite III to from 10 to 17 on sternite VII, and in the male from 2 or 3 on sternite III to 6 or 7 on sternite VII.

Modified segments—Female.—Antepygidial bristles, two, the lower one three-quarters to four-fifths the length of the upper one (fig. 2, A. p. b.). Head of receptaculum seminis (R. s.) nearly globular, its greatest length usually a fraction greater than its height (average height 0.051 mm., average length 0.055 mm.). Tail of receptaculum seminis long, thickest at the tip which is nearly truncate and more heavily chitinized than the sides of the tail. Sternite VII has a deep V-shaped notch. The length of the upper tooth, from base of notch to apex of tooth, varies from 0.07 to 0.14 mm., average 0.12 mm., while the length of the lower tooth varies from 0.11 to 0.22 mm., and averages 0.19 mm. The stylet (Sty.) bears either one or two lateral bristles in addition to the apical bristle, and is about three times as long as broad.

Modified segments—Male.—Antepygidial bristles, one. Manubrium of clasper (fig. 1, M) triangular, pointed, much broader at base and shorter than that of *O. tuberculatus.* The process (P) of the clasper has the upper and posterior margins evenly and continuously rounded, the lower posterior angle is nearly a right angle and the lower margin comparatively long and nearly horizontal. There are two long acetabular bristles. The exopodite (E), or movable process, of the clasper is most similar to that of *O. tuberculatus* but longer, more nearly vertical with the inner (anterior) face long, straight, and with a definite upper-anterior angle. Parameres (Par) comparatively thick at base with lower margin convex and evenly rounded to apex, upper margin slightly concave near apex. Sternite VIII without subapical bristles. Two short, thick membranous filaments, which are united on their basal third and usually appear as a single filament, extend from the apex of sternite VIII. The internal portion of sternite IX is moderately slender and of almost equal width throughout. The external portion of sternite IX is more slender near the apex than at the middle and is concave on the posterior margin.

Length.—Female, 2.3 to 2.7 mm., average 2.51 mm.; male, 1.8 to 2.2 mm., average 2.05 mm. for normally extended specimens. Hind femur: Female 0.44 to 0.50 mm., average 0.47 mm.; male, 0.40 to 0.53 mm., average 0.45 mm.

Type locality.—Baker County, Oreg.

Type host.—*Citellus oregonus* (Merriam).

Holotype ♀ and allotype ♂, lot No. O–767, were collected 8 miles south of Baker, Baker County, Oreg., on April 24, 1938, from *Citellus oregonus.*

Paratypes.—Sixty-five taken on *Citellus oregonus* in Oregon as follows: 1 ♀ in April 1938 in Umatilla County; 1 ♂ in May 1937 and 1 ♂, 6 ♀♀ in April 1938 in Union County; 5 ♂♂, 1 ♀ in May 1937, 3 ♂♂, 4 ♀♀ in June 1937, 1 ♂, 6 ♀♀ in July 1937, and 4 ♀♀ in March 1938 in Wallowa County; 10 ♂♂, 15 ♀♀ in April 1938 and 3 ♀♀ in May 1938 in Baker County; 1 ♂, 3 ♀♀ in May 1937 in Grant County.

Sixty-four paratypes were collected from *Citellus columbianus* (Ord) as follows: 1 ♂, 1 ♀ in April 1938 in Umatilla County, Oreg.; 2 ♂♂, 2 ♀♀ in July 1936, and 5 ♀♀ in April 1938 in Union County, Oreg.; 1♀ in May 1937, 5 ♂♂, 13 ♀♀ in June 1937, 1 ♀ in July 1937, 1 ♂ in March 1938, and 1 ♀ in April 1938 in Wallowa County, Oreg.; 7 ♂♂, 8 ♀♀ in April 1938 in Baker County, Oreg.; 1 ♂ ,1 ♀ in June 1937, and 3 ♂♂, 4 ♀♀ in May 1938 in Grant County, Oreg.; 6 ♂♂, 1 ♀ in August 1936 in Custer County, Idaho.

In addition to the above paratype material the following specimens in our collection seem to belong in this species: 1 ♀ from *Citellus oregonus* collected in Deschutes County, Oreg., in June 1938; 1 ♀ from *C. oregonus* in Harney County, Oreg., in July 1937; 2 ♀♀ from *Citellus townsendii* (Bachman) (=*C. mollis* (Kennicott)) in Harney County, Oreg., in June 1938; 1 ♀ from *C. townsendii* in Ada County, Idaho in June 1936; 1 ♂ from *Citellus idahoensis* Merriam in Elmore County, Idaho, in June 1936; and 1 ♀ from *Citellus* sp. in Crook County, Oreg., in June 1938.

All material from Oregon was collected by the Oregon State Plague Survey field truck, with E. C. Parkinson in charge. Specimens from Ada and Elmore Counties, Idaho, were collected by the United States Public Health Service Plague Survey field truck, with A. D. Davison in charge. Specimens from Custer County, Idaho, were collected by the Idaho State Plague Survey field truck.

The holotype and allotype are deposited in the collection of the United States Public Health Service Plague Laboratory, San Francisco, Calif. Paratypes have been deposited at the above laboratory and at the Rocky Mountain Laboratory, Hamilton, Mont., the United States National Museum, the California Academy of Sciences, and at the British Museum.

Variation.—One male from *Citellus columbianus*, Baker County, Oreg., April 29, 1938, No. O–769, has a single long subapical bristle on sternite VIII.

Notes.—The female of *O. oregonensis* is readily distinguished from previously described species of *Opisocrostis* by the deep V-shaped notch of sternite VII and by the almost globular head of, and the broad and somewhat chitinized tip of the tail of the receptaculum seminis. The male is easily distinguished by the entire lack of subapical bristles on sternite VIII; by the short, broad, ventrally convex parameres, which in other species of *Opisocrostis* are long, sickle-shaped, with the lower margin concave; by the apically slender, posteriorly concave sternite IX, which in other species is club-shaped; by the characteristic shapes of the exopodite and process of the clasper; and by the short, pointed, and extremely broad-based manubrium.

Opisocrostis washingtonensis, new species
(Figures 3 and 4)

Closely related to *O. oregonensis* Good and Prince.

Male and female.—Frontal tubercle distinct, about as prominent as in *O. tuberculatus*. Other characters, except modified segments, as in *O. oregonensis*.

Modified segments—Female.—Head of receptaculum seminis (R. s.) as in *O. oregonensis*, tail thickest near, but not at, the tip which is gently rounded but less so than in *O. labis*. The tip is more heavily chitinized than the sides, but not as much so as in *O. oregonensis*. The sinus in sternite VII is very small and inconspicuous, similar to that of *O. labis* but with the margins of the sinus no more heavily chitinized than the other parts of the sternite. Measurements of the sinus are as follows: Base of sinus to apex of upper lobe 0.019 to 0.051 mm., average 0.026 mm.; base of sinus to apex of lower lobe 0.055 to 0.078 mm., average 0.063 mm. Lower antepygidial bristle about nine-tenths the length of the upper one. Stylet at least two-fifths as broad as long, usually with one lateral bristle.

Modified segments—Male.—Manubrium (M) of clasper comparatively short but not as short as that of *O. oregonensis*. Its base is likewise comparatively broad but not as broad as in *O. oregonensis*. Its tip is narrowly rounded and slightly upturned. Process (P) of clasper short but high, the posterior margin straight, vertical, the lower-posterior angle very obtuse and the lower margin very short, almost obliterated. Exopodite (E) intermediate between those of *O. oregonensis* and *O. tuberculatus*, the inner (anterior) face rather short, sloping, sinuous, and slightly concave. Parameres (Par) nipple or lemon-shaped, broad at base. Sternite VIII with two long subapical bristles and two short, membranous apical filaments. Internal part of sternite IX similar to that of *O. oregonensis* but

slightly narrower throughout. External part of sternite IX similar to that of *O. oregonensis* but somewhat thicker from the middle to the apex.

Length.—Female, 2.4 to 2.9 mm., average 2.50 mm.; male, 1.7 to

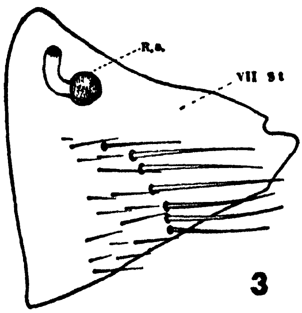

FIGURE 3.—*Opisocrostis washingtonensis* new species, female, sternite VII. ×81.

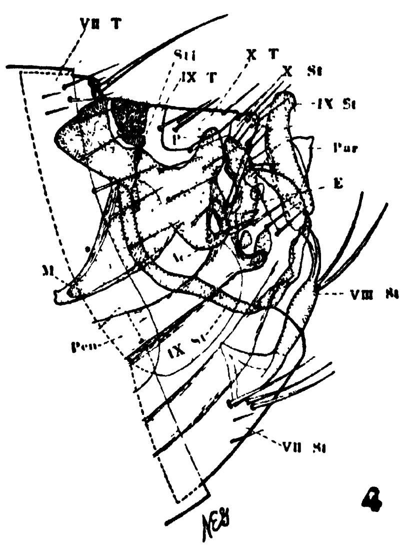

FIGURE 4.—*Opisocrostis washingtonensis* new species, male, genital segments. ×88.

2.1 mm., average 1.89 mm. Hind femur: Female, 0.46 to 0.56 mm., average 0.50 mm.; male, 0.38 to 0.45 mm., average 0.42 mm.

Type locality.—Adams County, Wash.

Type host.—*Citellus washingtoni* Howell (=*C. townsendii* auct.).

Holotype female, allotype male, and three female paratypes collected two miles east of Lind, Adams County, Wash., on March 7, 1938, from *Citellus washingtoni.*

Paratypes.—The following 105 paratypes were taken from *Citellus washingtoni:* 10♂♂, 12♀♀ in June 1937, and 10♂♂, 13♀♀ in June 1938 in Lincoln County, Wash.; 1♀ in May 1937, 13♂♂, 23♀♀ in

March 1938, 1 ♂, 12♀♀ in April 1938, 2♀♀ in May 1938, and 1 ♂, 3♀♀ in June 1938 in Adams County, Wash.; and 1 ♂, 3♀♀ in April 1938 in Umatilla County, Oreg.

Five paratypes were taken from *Citellus oregonus* as follows: 2♀♀ in July 1937, and 1 ♂ in May 1938 in Gilliam County, Oreg.; and 2 ♂♂ in May 1938 in Morrow County, Oreg.

All specimens from Washington were collected by the Washington State Plague Survey field truck, with L. J. Hughes in chafge. All specimens from Oregon were collected by the Oregon State Plague Survey field truck, with E. C. Parkinson in charge.

The holotype and allotype are deposited in the collection of the United States Public Health Service Plague Laboratory, San Francisco, Calif. Paratypes have been deposited at the above laboratory and at the Rocky Mountain Laboratory, Hamilton, Mont., the United States National Museum, the California Academy of Science, and the British Museum.

COURT DECISION ON PUBLIC HEALTH

Liability of town for pollution of stream.—(North Carolina Supreme Court; *Clinard et ux.* v. *Town of Kernersville et al.*, 3 S.E.2d 267; decided June 16, 1939.) An action was brought against a town and a knitting mill to recover damages because of the pollution of a stream which crossed plaintiffs' land. It appeared that water from the town's sewage disposal plant and water used by the knitting mill in connection with its dyeing process entered the stream. Because the dye water from the knitting company was disposed of under the sole supervision and control of the town, the supreme court said that no liability was imposed upon the company for any damage caused to plaintiffs' property, but that, if there was any damage, sole responsibility therefor rested upon the town. Damages had been awarded the plaintiffs in the lower court but, because the supreme court took the view that certain evidence should not have been submitted to the jury, a new trial was ordered. The appellate court concluded its opinion as follows:

> The plaintiffs are entitled to have permanent damages assessed for the maintenance of the continuing nuisance alleged, if established, or rather for the appropriation by the defendant of an easement over and across the lands of the plaintiffs in the use of the stream in the manner complained of. The damages to be thus assessed are those which are proximately caused by the use of the stream by the defendant in the manner alleged by the plaintiffs, if it is found that it is so used, which is a continuing and permanent use amounting to the appropriation of an easement. The damages are to be assessed as of the time the defendant first began to discharge into the stream water and other substance which polluted the water and produced noxious and offensive odors on plaintiffs' land. The damages are to be ascertained upon the basis of the difference between the fair

and reasonable market value of the property just before the defendant began to so use the stream and the fair and reasonable market value thereof just after the beginning of such use, assessed upon the theory that the defendant at that time took and appropriated an interest in the property of the plaintiffs for which it must pay. Past, present, and prospective damages are not to be considered.

DEATHS DURING WEEK ENDED AUGUST 26, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 26, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	6,895	7,120
Average for 3 prior years	[1] 7,188	
Total deaths, first 34 weeks of year	287,114	280,595
Deaths under 1 year of age	455	555
Average for 3 prior years	[1] 525	
Deaths under 1 year of age, first 34 weeks of year	17,207	18,076
Data from industrial insurance companies		
Policies in force	66,791,913	68,411,272
Number of death claims	10,328	11,019
Death claims per 1,000 policies in force, annual rate	8.1	8.4
Death claims per 1,000 policies, first 34 weeks of year, annual rate	10.4	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders ( ) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer

Cases of certain diseases reported by telegraph by State health officers for the week ended September 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Sept 2, 1939, rate	Sept 2, 1939, cases	Sept 3, 1938, cases	1934–38, median	Sept 2, 1939, rate	Sept 2, 1939, cases	Sept 3, 1938, cases	1934–38, median	Sept 2, 1939, rate	Sept. 2, 1939, cases	Sept 3, 1938, cases	1934–38, median
NEW ENG												
Maine	21	4	1	1	---	---	---	------	6	1	25	9
New Hampshire	0	0	0	0	---	-----	---	-----	0	0	1	0
Vermont	0	0	0	0	---	-----	----	------	40	3	0	0
Massachusetts	4	3	1	3	---	------	---	-- -	35	30	19	19
Rhode Island	0	0	0	0	-	- --	---	-	99	13	2	2
Connecticut	0	0	1	1		----	-----	1	33	11	4	4
MID ATL.												
New York	3	8	8	12	11	11	11	12	22	54	75	75
New Jersey	0	0	0	4	--- -	---	8	6	6	5	13	16
Pennsylvania	6	11	16	17	----	---	-	------	20	40	138	93
E NO CEN.												
Ohio	10	13	17	17	3	4	----	8	11	14	13	27
Indiana	18	12	3	5	3	2	3	12	10	7	3	3
Illinois	7	10	13	16	4	6	9	6	5	8	11	15
Michigan [1]	6	6	6	6	3	3	----	-----	0	0	28	27
Wisconsin	0	0	2	2	18	10	15	15	39	22	47	41
W. NO. CEN.												
Minnesota	10	10	9	2	2	1	2	1	50	26	20	6
Iowa	4	2	8	5	------	------	3	1	34	17	4	1
Missouri	9	7	7	10	-----	------	14	14	1	1	2	[illegible]
North Dakota	15	2	2	2	-----	------	7	-------	15	2	25	[illegible]
South Dakota	0	0	1	1	30	4	1	-------	38	5	0	[illegible]
Nebraska	0	0	1	1	------	-------	------	------	0	0	2	[illegible]
Kansas	25	9	1	2	------	-------	------	-------	6	2	3	[illegible]

For footnotes see end of table.

170189°—39——3

Cases of certain diseases reported by telegraph by State health officers for the week ended September 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median
SO. ATL.												
Delaware	0	0	2	1	-----	------	---	-----	0	0	0	0
Maryland [2 3]	3	1	6	6	-----	-----	3	2	12	4	1	6
Dist. of Col.	8	1	2	5	8	1	-	-----	16	2	1	1
Virginia [3]	30	16	36	21	22	12	-	-----	13	7	3	13
West Virginia	13	5	8	11	8	3	17	17	8	3	1	9
North Carolina [3]	89	61	61	36		-----	1	1	28	19	20	11
South Carolina [3]	16	6	23	4	314	115	103	53	8	3	1	1
Georgia [3]	75	45	34	14	25	15	-	-----	10	6	0	0
Florida [3]	9	3	6	8	12	4	-----	-----	12	4	22	1
E. SO. CEN.												
Kentucky	17	10	20	19		- -	3	3	3	2	0	9
Tennessee	11	6	5	15	12	7	13	6	11	6	2	2
Alabama [3]	21	12	40	26	11	6	13	5	2	1	0	4
Mississippi [2 3]	43	17	23	18	---	------	-----	------	-----	------	------	------
W. SO. CEN.												
Arkansas	55	22	14	12	30	12	15	3	7	3	13	0
Louisiana [3]	17	7	7	9	12	5	3	7	2	1	0	0
Oklahoma	14	7	8	6	8	4	12	8	6	3	8	0
Texas [3]	21	25	31	36	27	33	67	27	22	27	14	18
MOUNTAIN												
Montana	0	0	2	1	----	-----	----	------	103	11	10	4
Idaho	0	0	0	0		---	1	------	0	0	5	1
Wyoming	0	0	0	0	22	1	---	------	175	8	4	2
Colorado	63	13	20	6	24	5	-----	------	14	3	7	7
New Mexico	12	1	5	2	12	1	----	----	0	0	1	1
Arizona	0	0	0	2	86	7	13	7	12	1	4	1
Utah [2]	0	0	0	0	-----	------	-----	------	40	4	8	3
PACIFIC												
Washington	3	1	0	0	--	-----	----	------	71	23	4	5
Oregon	10	2	5	2	5	1	4	4	50	10	5	5
California	16	19	15	15	9	11	12	11	43	53	81	43
Total	15	377	470	463	13	274	343	339	19	465	650	633
35 weeks	15	12,780	15,410	15,802	205	152,280	46,816	104,679	403	349,371	761,975	669,686

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	2	6	1	2	7
New Hampshire	0	0	0	0	0	0	0	0	10	1	0	0
Vermont	0	0	0	0	27	2	0	0	13	1	1	1
Massachusetts	0	0	0	1	4	3	1	3	21	18	28	28
Rhode Island	0	0	0	0	0	0	0	0	0	0	0	3
Connecticut	0	0	0	0	3	1	2	2	9	3	6	4
MID. ATL.												
New York	0 4	1	2	3	40	100	14	14	18	46	40	72
New Jersey	0	0	0	1	12	10	3	4	19	16	9	13
Pennsylvania	1	2	4	4	22	44	3	13	29	57	74	66

For footnotes see end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept 3, 1938, cases	1934–38, median	Sept 2, 1939, rate	Sept. 2, 1939, cases	Sept 3, 1938, cases	1934–38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934–38, median
E NO CEN												
Ohio	1.5	2	1	1	8	11	2	14	35	46	34	49
Indiana	0	0	1	1	3	2	0	2	49	33	37	28
Illinois	0	0	0	3	6	9	3	19	37	57	55	82
Michigan [2]	0	1	0	0	115	109	5	26	79	75	62	54
Wisconsin	1.8	1	0	1	12	7	7	7	110	66	42	42
W NO CEN.												
Minnesota	0	0	0	0	116	60	1	5	25	13	21	18
Iowa	0	0	1	1	4	2	1	2	43	21	17	13
Missouri	0	0	0	2	0	0	0	0	18	14	16	19
North Dakota	7	1	0	0	7	1	0	1	44	6	9	4
South Dakota	0	0	0	0	8	1	0	0	68	9	6	6
Nebraska	4	1	0	0	8	2	0	0	11	3	4	4
Kansas	0	0	0	0	8	3	0	2	77	27	55	17
SO ATL.												
Delaware	0	0	0	0	0	0	0	0	20		5	4
Maryland [2 3]	0	0	1	1	3	1	0	0	37	12	2	11
Dist of Col	8	1	0	1	8	1	1	1	16	2	11	4
Virginia [3]	0	0	1	2	0	0	3	5	9	5	10	12
West Virginia	2.7	1	1	1	5	2	1	3	27	10	16	21
North Carolina [3]	1.5	1	3	2	12	8	2	3	44	30	24	24
South Carolina [3]	0	0	0	0	16	6	0	0	8	3	4	2
Georgia [3]	0	0	0	0	3	2	0	1	22	13	15	9
Florida [3]	0	0	0	0	21	7	1	1	6	2	2	2
E SO CEN												
Kentucky	1.7	1	1	2	5	3	0	7	50	29	38	29
Tennessee	0	0	0	0	5	3	1	1	18	10	11	11
Alabama [3]	0	0	4	1	1.8	1	2	4	30	17	17	11
Mississippi [2 3]	2.5	1	1	0	0	0	2	2	28	11	8	8
W SO CEN.												
Arkansas	0	0	0	0	5	2	0	0	22	9	4	4
Louisiana [3]	0	0	1	0	0	0	0	0	2	1	8	8
Oklahoma	0	0	0	0	4	2	0	0	18	9	5	6
Texas [3]	0	0	2	0	7	8	1	3	26	31	31	21
MOUNTAIN												
Montana	0	0	1	0	0	0	2	2	84	9	8	5
Idaho	0	0	0	0	10	1	0	0	0	0	6	3
Wyoming	0	0	0	0	0	0	0	0	65	3	3	4
Colorado	0	0	0	0	5	1	0	2	19	4	7	11
New Mexico	0	0	0	0	25	2	0	0	12	1	2	2
Arizona	12	1	0	0	98	8	0	1	12	1	0	1
Utah [4]	0	0	0	0	10	1	0	0	50	5	7	10
PACIFIC												
Washington	0	0	1	1	3	1	1	1	25	8	8	9
Oregon	0	0	0	0	10	2	1	1	30	6	17	16
California	0	0	0	3	41	50	3	24	44	54	53	53
Total	0.6	15	26	42	10	479	63	323	32	799	843	862
35 weeks	1.6	1,123	2,214	4,202	3.4	3,018	1,090	4,687	131	117,978	138,694	166,580

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934-38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases
NEW ENG.											
Maine	0	0	0	0	24	4	1	1	91	15	24
New Hampshire	0	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	13	1	0	0	684	51	19
Massachusetts	0	0	0	0	5	4	1	4	132	112	78
Rhode Island	0	0	0	0	0	0	1	0	208	39	10
Connecticut	0	0	0	0	12	4	3	3	196	66	28
MID. ATL.											
New York	0	0	0	0	4	11	28	29	106	261	484
New Jersey	0	0	0	0	7	6	15	6	114	96	186
Pennsylvania	0	0	0	0	8	16	24	24	222	438	319
E. NO. CEN.											
Ohio	2	2	0	0	8	10	29	37	161	209	149
Indiana	0	0	3	0	21	14	16	16	65	44	8
Illinois	1	1	2	1	170	[4] 259	20	25	144	220	504
Michigan [2]	0	0	1	1	10	9	14	16	202	191	296
Wisconsin	0	0	0	1	0	0	5	3	213	121	402
W. NO. CEN.											
Minnesota	6	3	4	1	4	2	0	2	33	17	40
Iowa	4	2	0	0	6	3	4	5	38	19	26
Missouri	0	0	2	1	12	9	25	27	26	20	8
North Dakota	0	0	3	0	7	1	0	0	248	34	60
South Dakota	8	1	0	0	0	0	1	2	105	14	3
Nebraska	4	1	0	0	4	1	0	0	8	2	1
Kansas	0	0	1	1	11	4	11	12	48	17	37
SO. ATL.											
Delaware	0	0	0	0	20	1	2	1	118	6	8
Maryland [2] [3]	0	0	0	0	15	5	10	11	120	39	23
Dist. of Col.	0	0	0	0	16	2	7	5	234	29	16
Virginia [3]	0	0	0	0	24	13	7	19	34	18	9
West Virginia	0	0	0	0	32	12	39	18	13	5	40
North Carolina [3]	0	0	0	0	29	20	14	16	161	110	224
South Carolina [3]	0	0	0	0	16	6	10	18	16	6	69
Georgia [3]	0	0	0	0	30	18	18	34	28	17	16
Florida [3]	0	0	0	0	3	1	6	3	21	7	0
E. SO. CEN.											
Kentucky	2	1	0	0	57	33	22	44	42	24	29
Tennessee	0	0	0	0	16	9	9	33	39	22	9
Alabama [3]	0	0	1	0	11	6	16	16	32	18	6
Mississippi [2] [3]	0	0	0	0	23	9	8	9	------	------	------
W. SO. CEN.											
Arkansas	5	2	0	0	47	19	30	12	40	16	17
Louisiana [3]	0	0	0	0	48	20	13	19	56	23	22
Oklahoma	0	0	0	0	26	13	16	18	4	2	1
Texas [3]	0	0	0	1	50	60	51	51	33	40	112
MOUNTAIN											
Montana	0	0	0	1	19	2	0	5	103	11	57
Idaho	0	0	0	0	20	2	2	2	10	1	3
Wyoming	0	0	0	0	22	1	1	1	65	3	1
Colorado	5	1	0	0	14	3	11	6	48	9	31
New Mexico	0	0	6	0	80	7	10	10	124	10	30
Arizona	12	1	0	0	25	2	8	4	12	1	14
Utah [3]	0	0	0	0	20	2	2	2	387	30	28

For footnotes see end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 2, 1939, rate	Sept 2, 1939, cases	Sept 3, 1938, cases	1934–38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases	1934–38, median	Sept. 2, 1939, rate	Sept. 2, 1939, cases	Sept. 3, 1938, cases
PACIFIC											
Washington	0	0	4	3	9	3	10	3	37	12	23
Oregon	5	1	12	0	15	3	2	7	35	7	8
California	0	0	3	1	10	12	12	12	55	67	147
Total	1	16	42	27	26	642	543	614	102	2,531	3,025
35 weeks	10	8,707	12,769	6,139	9	8,226	9,269	9,374	152	131,769	151,689

[1] New York City only.
[2] Period ended earlier than Saturday
[3] Typhus fever, week ended Sept. 2, 1939, 93 cases as follows Maryland, 1; Virginia, 1; North Carolina, 4; South Carolina, 5, Georgia, 37, Florida, 6, Alabama, 9; Mississippi, 2; Lousiana, 5; Texas, 23
[4] 240 cases of typhoid fever, with 8 deaths, have been reported for the week at the Manteno State Hospital, Manteno, Ill.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Sept. 9, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Week ended Aug. 19	Week ended Aug. 26	Week ended Sept 2	Week ended Sept. 9
Eastern:										
New York				3	3	1			1	
New Jersey				4	8	7	6	1	1	
Pennsylvania				6	3	4		1		
Delaware				3			1			
Maryland			7	13	11	23	2	6	3	1
District of Columbia			2	2	2	3	1	1		
Virginia			1	13	10	11	2	1	2	6
West Virginia						1				
North Carolina				3	13	13	3	2		1
Georgia					1	1				
Central:										
Ohio				3	2	4		3		
Indiana				2	1	3	2	1		2
Illinois			1	1	5	7	1			
Kentucky							3	2		1
Tennessee					5	5	4	2	1	2
Iowa			1	10	9	6	1			
Missouri				1		4		1	1	2
Western:										
Montana	[1] 2	2	8	5	1	2			1	
Idaho		4	7	4	5					
Wyoming		3	14	16	5	5				
Colorado		2	3	9	4					
Arizona								1		
Utah		2	5	5	6	2		1		
Washington		2	3	2						
Oregon		9	10	7	2	1				

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
July 1939										
Alaska	0	8		426	0		0			1
Dist of Col	29	1		109	1		0	9	0	9
Georgia	55	80	306	62	2	48	32	35	1	135
Hawaii Territory	20	4	1	9	0		19	1	0	2
Illinois	81	22	166	77	2		18	280	11	67
Kansas	4	5	4	53	5		6	94	2	13
Kentucky	17	8	7	14	8	13	9	32	1	130
Massachusetts	15			1,107	3	4	3	156	0	22
Montana	2	4		126	1			36	2	6
New Mexico	7		7	17	1	2	3	22	1	21
North Carolina	44	6	104	212	4	84	20	63	2	81
North Dakota	10	9	1	45	2		4	11	6	2
Ohio	38	27	7	140	2		14	281	25	49
Oklahoma	11	26	463	101		29	8	26	14	108
Rhode Island	1			211	1		0	10	0	5
South Dakota	8	27	1	56	1		0	49	21	3
Utah	5	1	1	103	0		2	27	0	4
Virginia	56	99	15	438	6	19	6	54	0	116

July 1939

	Cases
Actinomycosis:	
Hawaii Territory	1
Chickenpox:	
Alaska	3
District of Columbia	18
Georgia	23
Hawaii Territory	24
Illinois	272
Kansas	34
Kentucky	9
Massachusetts	332
Montana	47
New Mexico	7
North Carolina	18
North Dakota	34
Ohio	277
Oklahoma	13
Rhode Island	16
South Dakota	2
Utah	80
Virginia	37
Conjunctivitis, infectious:	
Georgia	7
Hawaii Territory	26
Oklahoma	2
Diarrhea:	
New Mexico	15
Ohio (under 2 years; enteritis included)	229
Dysentery:	
Georgia (amoebic)	10
Georgia (bacillary)	41
Georgia (unspecified)	14
Hawaii Territory (amoebic)	2
Illinois (amoebic)	5
Illinois (amoebic carriers)	23
Illinois (bacillary)	25
Kansas (bacillary)	2
Kentucky (amoebic)	3
Kentucky (bacillary)	111
Massachusetts (bacillary)	16
Montana (bacillary)	5
New Mexico (amoebic)	2
New Mexico (bacillary)	7
New Mexico (unspecified)	8

	Cases
Dysentery—Continued.	
North Carolina (bacillary)	5
Ohio (bacillary)	39
Oklahoma (amoebic)	2
Oklahoma (bacillary)	133
Utah	4
Virginia (amoebic)	1
Virginia (bacillary)	1,521
Encephalitis, epidemic or lethargic.	
Hawaii Territory	1
Illinois	8
Kansas	4
Massachusetts	1
Montana	2
North Dakota	2
Oklahoma	1
German measles:	
Alaska	4
Illinois	16
Kansas	5
Massachusetts	39
New Mexico	1
North Carolina	16
North Dakota	3
Ohio	18
Rhode Island	4
Utah	9
Hookworm disease:	
Georgia	832
Hawaii Territory	14
Oklahoma	5
Impetigo contagiosa:	
Alaska	1
Hawaii Territory	31
Kansas	9
Montana	5
Ohio	72
Oklahoma	6
Jaundice, infectious:	
Hawaii Territory	2
Utah	1
Lead poisoning:	
Ohio	6
Leprosy:	
Hawaii Territory	5
Mumps:	
Alaska	2
Georgia	82

	Cases
Mumps—Continued.	
Hawaii Territory	61
Illinois	231
Kansas	130
Kentucky	18
Massachusetts	157
Montana	17
New Mexico	7
North Dakota	14
Ohio	462
Oklahoma	7
Rhode Island	31
South Dakota	6
Utah	158
Virginia	45
Ophthalmia neonatorum:	
Illinois	6
Massachusetts	70
Rhode Island	1
Puerperal septicemia:	
Georgia	2
Rabies in animals:	
Illinois	15
Massachusetts	6
New Mexico	3
Oklahoma	8
Rhode Island	2
Rocky Mountain spotted fever.	
District of Columbia	3
Georgia	1
Illinois	7
Montana	3
North Carolina	14
Ohio	3
Utah	5
Virginia	12
Scabies:	
Kansas	2
Oklahoma	2
Septic sore throat:	
Georgia	59
Hawaii Territory	1
Illinois	2
Kansas	8
Kentucky	4
Massachusetts	9
Montana	7
New Mexico	4
North Carolina	8
Ohio	12

Summary of monthly reports from States—Continued

July 1939—Continued

	Cases
Septic sore throat—Con.	
Oklahoma	55
Rhode Island	2
South Dakota	1
Utah	2
Virginia	83
Tetanus:	
Hawaii Territory	1
Illinois	8
Kansas	2
Massachusetts	4
Ohio	2
Virginia	1
Trachoma:	
Hawaii Territory	1
Illinois	33
Kansas	1
Kentucky	29
Montana	21
New Mexico	8
North Dakota	4
Ohio	5
Oklahoma	5
Utah	3
Virginia	1
Trichinosis:	
Massachusetts	1
Ohio	1

	Cases
Tularaemia:	
Georgia	2
Illinois	1
Kansas	10
Kentucky	1
Montana	1
Utah	9
Virginia	8
Typhus fever:	
Georgia	145
Hawaii Territory	4
North Carolina	31
Virginia	1
Undulant fever	
District of Columbia	1
Georgia	15
Illinois	21
Kansas	12
Kentucky	1
Massachusetts	5
New Mexico	2
North Carolina	2
Ohio	6
Oklahoma	107
Rhode Island	4
South Dakota	3

	Cases
Undulant fever—Con.	
Utah	2
Virginia	4
Vincent's infection:	
Illinois	6
Kansas	9
North Dakota	2
Oklahoma	21
Whooping cough:	
District of Columbia	157
Georgia	233
Hawaii Territory	233
Illinois	1,487
Kansas	71
Kentucky	164
Massachusetts	445
Montana	33
New Mexico	82
North Carolina	825
North Dakota	109
Ohio	1,116
Oklahoma	19
Rhode Island	102
South Dakota	12
Utah	231
Virginia	561

WEEKLY REPORTS FROM CITIES

City reports for week ended August 26, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities											
5-year average	73	35	11	200	282	219	3	338	87	1,223	-------
Current week [1]	73	25	10	128	206	196	1	306	53	1,017	-------
Maine:											
Portland	0	------	0	0	2	0	0	0	0	8	20
New Hampshire											
Concord	0	-----	0	0	0	0	0	0	0	0	2
Nashua	0	----	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	0	-----	-------	0	-----	0	0	--	0	0	-------
Burlington	0	------	0	0	0	0	0	0	0	6	9
Rutland	0	-----	0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	2	----	0	5	1	2	0	8	3	23	195
Fall River	0	-----	0	0	0	0	0	3	0	2	31
Springfield	0	------	0	0	0	1	0	1	0	3	28
Worcester	------	------	-------	-------	-------	-----	-------	-------	-----	-----	-------
Rhode Island											
Pawtucket	0	-----	0	0	0	0	0	0	0	0	14
Providence	0	------	0	11	3	1	0	1	0	21	45
Connecticut:											
Bridgeport	0	------	0	4	0	0	0	0	0	0	26
Hartford	0	-----	0	0	1	0	0	0	0	26	36
New Haven	0	------	0	6	2	0	0	0	1	19	28
New York:											
Buffalo	0	----	0	0	2	3	0	4	0	17	118
New York	7	2	1	24	46	19	0	65	9	105	1,168
Rochester	0	------	0	1	4	0	0	1	0	13	51
Syracuse	0	------	0	0	0	0	0	0	0	42	46
New Jersey:											
Camden	0	------	0	0	0	5	0	0	0	0	28
Newark	0	1	0	2	3	0	0	8	1	17	78
Trenton	0	1	0	0	2	1	0	2	0	2	34

[1] Figures for Worcester estimated; report not received.

City reports for week ended August 26, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Pennsylvania:											
Philadelphia	1	1	1	4	7	7	0	11	4	87	360
Pittsburgh	5	2	2	0	5	6	0	4	0	40	122
Reading	0	------	0	0	1	0	0	1	0	0	18
Scranton	0	------	------	0	------	1	0	------	0	0	------
Ohio:											
Cincinnati	1	------	0	0	2	8	0	4	1	22	108
Cleveland	0	2	2	2	9	5	0	9	0	72	156
Columbus	2	------	0	0	3	2	0	4	0	9	68
Toledo	1	------	0	2	4	4	0	2	0	12	60
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	8
Fort Wayne	0	------	0	0	2	0	0	0	0	0	24
Indianapolis	1	------	1	1	6	2	0	5	0	32	108
Muncie	0	------	0	0	3	0	0	0	0	0	12
South Bend	0	------	0	0	2	0	0	0	0	0	16
Terre Haute	0	------	0	0	2	0	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	6
Chicago	5	3	0	9	13	24	0	28	1	82	533
Elgin	0	------	0	0	0	0	0	0	0	11	4
Moline	0	------	0	0	0	0	0	0	0	4	8
Springfield	0	------	0	0	1	0	0	0	0	9	19
Michigan:											
Detroit	9	------	0	4	5	26	0	10	1	72	214
Flint	0	------	0	4	0	1	0	0	0	9	23
Grand Rapids	0	------	0	0	1	4	0	0	0	5	28
Wisconsin:											
Kenosha	0	------	0	0	0	8	0	0	0	0	6
Milwaukee	0	------	0	0	0	12	0	3	0	15	62
Racine	0	------	0	0	0	1	0	0	0	2	19
Superior	0	------	0	1	0	0	0	0	0	0	8
Minnesota:											
Duluth	0	------	0	3	0	0	0	0	0	0	22
Minneapolis	0	------	0	1	0	2	0	1	0	8	79
St. Paul	0	------	0	0	3	0	0	2	0	26	69
Iowa:											
Cedar Rapids	0	------	------	1	------	0	0	------	0	1	------
Davenport	0	------	0	0	0	0	0	0	0	0	------
Des Moines	1	------	0	0	0	4	2	0	0	0	21
Sioux City	0	------	------	0	------	0	0	------	0	3	------
Waterloo	1	------	------	0	------	0	0	------	0	3	------
Missouri:											
Kansas City	1	------	0	1	1	3	0	2	5	0	82
St. Joseph	0	------	0	0	0	0	0	0	0	0	25
St. Louis	1	------	0	0	1	4	0	4	4	19	155
North Dakota:											
Fargo	0	------	0	0	0	0	0	1	0	1	7
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	0	------	0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	9
Nebraska:											
Lincoln	0	------	0	0	0	0	0	0	0	2	5
Omaha	2	------	0	0	1	0	0	0	0	2	38
Kansas:											
Lawrence	0	------	------	0	------	0	0	------	0	0	------
Topeka	0	------	0	0	1	0	0	0	0	0	16
Wichita	0	------	0	0	1	0	0	0	0	1	22
Delaware:											
Wilmington	0	------	0	1	1	0	0	2	0	1	26
Maryland:											
Baltimore	0	------	0	0	5	3	0	14	0	54	181
Cumberland	0	------	0	0	0	0	0	0	0	0	10
Frederick	0	------	0	0	0	0	0	1	0	0	8
Dist. of Col.:											
Washington	2	1	1	2	4	5	0	13	1	1	161
Virginia:											
Lynchburg	0	------	0	0	0	0	0	1	2	34	8
Richmond	0	------	0	1	1	0	0	2	2	0	43
Roanoke	0	------	0	2	2	0	0	0	1	0	16
West Virginia:											
Charleston	0	------	0	0	0	0	0	0	1	0	11
Huntington	0	------	------	0	------	1	0	------	0	0	------
Wheeling	0	------	0	1	0	0	0	0	0	1	------

City reports for week ended August 26, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
North Carolina:											
Gastonia	1			0		0	0		0	4	
Raleigh	5		0	0	0	0	0	0	1	5	8
Wilmington	1		0	0	0	0	0	0	0	0	10
Winston-Salem	1		0	0	0	1	0	2	0	0	15
South Carolina:											
Charleston	1	3	0	0	0	0	0	1	0	0	15
Florence	0		0	0	1	0	0	0	0	0	8
Greenville	0		0	0	0	0	0	0	0	0	12
Georgia:											
Atlanta	2	3	0	0	2	3	0	7	1	4	67
Brunswick	0		0	0	1	0	0	0	0	0	2
Savannah	0		0	1	0	0	0	1	1	7	28
Florida:											
Miami	2		0	1	4	0	0	0	0	0	33
Tampa	0		0	0	1	0	0	0	1	0	15
Kentucky:											
Ashland	0		0	0	0	0	0	0	0	0	4
Covington	2		0	0	0	0	0	1	0	0	11
Lexington	0		0	0	0	2	0	0	0	4	21
Louisville	1	3	0	1	2	3	0	2	0	24	45
Tennessee:											
Knoxville	0		0	0	0	1	0	1	0	2	30
Memphis	0		0	0	0	1	0	1	0	13	58
Nashville	2		0	0	0	1	0	1	0	5	40
Alabama:											
Birmingham	1		0	0	1	0	0	7	3	2	69
Mobile	2		0	0	0	1	0	1	0	0	24
Montgomery	0			0		0	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0	1	0	0	5	0	0	5	0	2	
Louisiana:											
Lake Charles	1		0	0	1	0	0	1	0	0	10
New Orleans	2	3	1	0	10	0	0	7	1	0	127
Shreveport	0		0	0	4	0	0	2	3	0	50
Oklahoma:											
Oklahoma City	0		0	0	1	0	0	1	0	0	28
Tulsa	0			0		1	0		0	0	
Texas:											
Dallas	2		0	2	1	1	0	0	1	3	50
Fort Worth	0		0	0	3	0	0	2	0	0	20
Galveston	0		0	0	1	0	0	0	0	0	12
Houston	2		0	0	1	2	0	6	0	0	91
San Antonio	0		0	0	5	0	0	10	0	0	58
Montana:											
Billings	0		0	0	0	0	0	0	0	0	5
Great Falls	0		0	1	1	3	0	0	0	0	15
Helena	0		0	0	0	0	0	0	0	1	3
Missoula	0		0	0	0	0	0	0	0	0	10
Idaho:											
Boise	0		0	0	0	0	0	0	0	3	5
Colorado:											
Colorado Springs	0		0	0	0	4	0	0	0	0	11
Denver	7		0	3	0	2	0	4	0	3	64
Pueblo	0		0	1	2	1	1	0	0	0	8
New Mexico:											
Albuquerque	0		0	0	0	0	0	0	0	0	11
Utah:											
Salt Lake City	0		0	4	3	6	0	0	1	27	27
Washington:											
Seattle	0		0	3	2	0	0	5	0	6	70
Spokane	0		0	1	3	3	0	0	0	0	31
Tacoma	0		0	3	0	0	0	0	0	2	33
Oregon:											
Portland	2		1	4	0	1	0	0	0	5	58
Salem	0			0		0	0		0	0	
California:											
Los Angeles	5	2	1	8	4	13	0	19	1	13	307
Sacramento	0		0	1	1	2	0	2	2	0	32
San Francisco	1		0	2	8	1	0	9	0	0	138

City reports for week ended August 26, 1939—Continued

State and city	Meningitis, meningococcus		Polio-myelitis cases	State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				North Dakota:			
Boston	0	1	1	Fargo	0	0	1
New York:				District of Columbia:			
Buffalo	0	0	11	Washington	0	0	1
New York	1	0	19	North Carolina:			
New Jersey:				Wilmington	0	0	1
Camden	0	0	6	South Carolina:			
Newark	0	0	1	Charleston	0	0	3
Pennsylvania:				Georgia:			
Philadelphia	0	0	14	Atlanta	0	1	0
Ohio:				Florida:			
Cincinnati	1	0	0	Tampa	0	0	1
Cleveland	0	0	3	Louisiana:			
Illinois:				Shreveport	0	2	0
Alton	0	0	2	Texas:			
Chicago	1	0	7	San Antonio	0	0	1
Michigan:				Colorado:			
Detroit	0	0	72	Denver	0	0	1
Grand Rapids	0	0	1	Washington:			
Wisconsin:				Seattle	0	0	1
Milwaukee	0	0	1	Spokane	0	0	1
Minnesota:				California:			
Minneapolis	0	0	9	Los Angeles	0	0	9
St. Paul	0	0	2	Sacramento	0	0	1
Missouri:							
Kansas City	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: New York, 4; Trenton, 1; Springfield, Ill., 1; Louisville, 1; Sacramento, 1.

Pellagra.—Cases: Charleston, S. C., 1; Atlanta, 2; Louisville, 1.

Typhus fever.—Cases: New York, 1; Charleston, S. C., 3; Atlanta, 3; Savannah, 5; Miami, 1; Knoxville, 1; Birmingham, 1; Mobile, 2; Lake Charles, 1; Dallas, 1; Fort Worth, 2; Houston, 3. Deaths: Houston, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 29, 1939.—During the week ended July 29, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1						1
Chickenpox		7		38	77	13	25	3	17	180
Diphtheria	2	3	2	22	1	3			1	34
Dysentery				1	1					2
Influenza		3			1					4
Lethargic encephalitis					1					1
Measles		22	1	140	145	41			6	355
Mumps				21	19	7			3	50
Pneumonia	1	4			1				1	7
Poliomyelitis					14		2			16
Scarlet fever	8	2	4	71	46	5	1	5	2	144
Tuberculosis	3	5	9	86	36	60				199
Typhoid and paratyphoid fever	1		4	15	4	1				25
Whooping cough		30	4	53	60	16	27	7	26	229

CUBA

Provinces—Notifiable diseases—4 weeks ended June 24, 1939.—During the 4 weeks ended June 24, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer				5		9	14
Chickenpox		1		1		3	5
Diphtheria	3	12	3	1		1	20
Hookworm disease		114				5	119
Leprosy						1	1
Malaria	10	8		14	4	17	53
Measles		1		2			3
Poliomyelitis		1					1
Scarlet fever		1					1
Tuberculosis	14	66	28	116	6	67	297
Typhoid fever	40	62	25	47	15	34	223
Whooping cough				3			3

SCOTLAND

Vital statistics—Second quarter 1939.—Following are vital statistics for Scotland for the second quarter of 1939.

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	9,957	8.0	Deaths from—Continued.		
Births	23,615	18.9	Influenza	95	
Deaths	15,671	12.5	Lethargic encephalitis	80	
Deaths under 1 year of age	1,442	[1] 61	Measles	8	
Deaths from—			Nephritis, acute and chronic	471	
Appendicitis	96		Pneumonia (all forms)	630	0.51
Cancer	2,095	1.68	Poliomyelitis	1	
Cerebral hemorrhage	1,653		Puerperal sepsis	21	
Cerebrospinal fever	9		Scarlet fever	12	
Cirrhosis of the liver	42		Senility	575	
Diabetes mellitus	190		Suicide	125	
			Syphilis	21	
Diarrhea and enteritis (under 2 years)	137		Tuberculosis (all forms)	943	.75
Diphtheria	79		Typhoid fever	3	
Dysentery	8		Whooping cough	108	
Heart disease	3,815				

[1] Per 1,000 live births.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of August 25, 1939, pages 1573-1585. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

India—Rangoon.—During the week ended August 26, 1939, 1 fatal case of plague was reported in Rangoon, India.

Smallpox

Iran—Teheran.—During the week ended July 29, 1939, 6 deaths from smallpox were reported in Teheran, Iran.

Mexico.—For the period May 1 to June 30, 1939, the following provisional report of deaths from smallpox was received: Aguascalientes State, 3; Chihuahua State, 5; Coahuila State, 2; Guanajuato State, 246; Guerrero State, 3; Hidalgo State, 13; Jalisco State, 4; Mexico, D. F., 4; Mexico State, 146; Michoacan State, 137; Morelos State, 9; Nayarit State, 2; Oaxaca State, 1; Puebla State, 20; Queretaro State, 34; San Luis Potosi State, 22; Sinaloa State, 7; Zacatecas State, 27. For the month of June 1939, smallpox was reported in certain cities as follows: Colima, Colima State, 1 case; Mexico, D. F., 5 cases, 1 death; Monterrey, Nuevo Leon State, 1 death; San Luis Potosi, San Luis Potosi State, 8 cases, 5 deaths.

Venezuela.—During the period July 16-31, 1939, 1 case of smallpox was reported in Caracas, D. F., and 1 case in Cumarebo, Venezuela.

Typhus Fever

Mexico.—For the period May 1 to June 30, 1939, the following provisional report of deaths from typhus fever, by States, was received: Aguascalientes, 4; Chihuahua, 1; Coahuila, 2; Durango, 2; Federal District, 5; Guanajuato, 7; Guerrero, 2; Hidalgo, 15; Jalisco, 3; Mexico, 21; Michoacan, 10; Oaxaca, 22; Puebla, 24; Queretaro, 4; San Luis Potosi, 2; Sonora, 2; Tabasco, 1; Tlaxcala, 2; Vera Cruz, 3; Zacatecas, 17. For the month of June 1939, typhus fever was reported, by cities, as follows: Mexico, D. F., 27 cases, 11 deaths; Saltillo, Coahuila State, 8 cases, 1 death; San Luis Potosi, San Luis Potosi State, 1 case.

Yellow Fever

Brazil.—Yellow fever has been reported in Brazil as follows: Parintins, Amazonas State, 1 death on July 13; Tauri, Para State, 1 death on July 11.

Nigeria—Ilorin.—On August 24, 1939, 1 suspected case of yellow fever was reported in Ilorin, Nigeria.

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Public Health Reports

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IN THIS ISSUE

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

During the week ended September 16, 501 cases of poliomyelitis were reported in the United States, as compared with 436 cases during the preceding week and a median of 310 cases for the corresponding week of the years 1934–38. The incidence during the current week was over 60 percent in excess of the 5-year median. During the week ended September 9, a decrease was recorded over the preceding week, with a rise during the current week. The 5-year median figure also follows this trend.

New York reported 116 cases (with 20 in New York City), Michigan 61 (with 27 cases in Detroit), Minnesota 60 (of which 17 cases occurred in Minneapolis), California 42 (with 16 cases in Los Angeles), Pennsylvania 41 (with 31 cases in Philadelphia), New Jersey 28, Colorado 18, Illinois 16, Ohio 13, and Iowa and Texas 12 cases each. The number of cases reported in South Carolina decreased from 12 during the preceding week to 5 during the current week.

A PROCEDURE FOR PUTTING HEALTH DEPARTMENT REPORTS TO WORK[1]

By Mayhew Derryberry, *Senior Public Health Statistician*, and J. O. Dean, *Passed Assistant Surgeon, United States Public Health Service*

A determination of the relative importance of the various health needs of a community and of the extent to which the public health program is focused on those needs is a matter of primary concern to a health officer. As an administrator he should know that his program is concentrated on the important health problems in his community and that there is a proper balance in the various services performed by the different members of his staff. If neonatal mortality is a serious problem and typhoid fever is of minor significance he should direct the major effort of his organization into activities purported to reduce neonatal deaths and give just enough attention to typhoid fever to keep it at its low level. If his staff is concentrating all of its efforts

[1] From the Division of Public Health Methods, National Institute of Health, and the Division of Domestic Quarantine.

on infant hygiene, and giving little attention to prenatal care, he may wish to reapportion its activities into a better division of service.

Decisions of this character can be made only if the health officer has available evidence on the relative significance of the health problems in his community and on the activities of his various professional workers. Specifically, he needs data on morbidity, mortality, sanitary conditions, and other health situations under his jurisdiction, as well as records of the individuals served by his staff, the type of service rendered, the intensity of the service, and perhaps some measure of its effectiveness. Although practically all local health departments keep records on the items mentioned above, and make periodic reports on them,[2] the results of studies of health department practice made by the Division of Public Health Methods indicate that the maximum use of these records and reports as guides to administrative judgment is not being made.[3]

One reason why the records are not utilized more extensively is the complexity of the data with which the health officer must deal. The situation is not as simple as the illustration cited above in which the data on only two problems must be considered and a decision made relative to the importance of each. Instead the health officer must study data on a number of problems, including the prevention of various diseases, the control of different aspects of environmental sanitation, and the need for education in general healthful living. From such study he must decide upon the relative emphasis to be given to each of these factors in the health department program. Furthermore, he must consider how much service, such as clinic consultations, prophylactic treatments, group conferences, school examinations, and home visiting, his staff may be expected to give and which combinations of these types of service are likely to yield the best results for each problem on which his program is focused. Adding to the complexity caused by the multitude of items to be considered is the difference in significance of the same sized figures when applied to varying health conditions and types of service. For example, a community with a typhoid fever mortality rate of 4.0 has a rate that is worse than that of the majority of other communities, whereas a community with a maternal mortality rate of 4.0 has a very favorable

[2] Keeping of records of the type mentioned is necessary in order to file the quarterly reports required of all local health departments receiving grants-in-aid under titles V and VI of the Social Security Act. The details are outlined in Tabulation of Health Department Services—Report of Committee on Records and Reports to State and Territorial Health Officers and the United States Public Health Service in Thirty-fourth Annual Conference, Washington, D. C., April 13-14, 1936. Pub. Health Rep., 51: 1236-1251 (September 4, 1936).

[3] Dean, J. O. and Flook, Evelyn: Do health officers supervise their staffs? In manuscript.

Bean, Helen, and Hankla, Emily: Case records as an index of the public health nurse's work. Pub. Health Rep., 52: 1077-1088 (August 6, 1937).

Derryberry, Mayhew: Do case records guide the nursing service? Pub. Health Rep., 54: 66-76 (January 20, 1939).

Derryberry, Mayhew: Nursing accomplishments as revealed by case records. Pub. Health Rep. (In press).

standing among other communities in regard to maternal mortality. Likewise, 6 home visits per case of tuberculosis constitute a much less intensive program of visiting for tuberculosis control than the same number of visits made for each case of diphtheria or measles.

Unless complete eradication be feasible, there is no absolute minimum standard of sickness and death which a county should strive to maintain, and no absolute standard of intensity of service that should be rendered for the many health problems.[4] In the absence of such standards and because of the mass of data to be considered, the health officer frequently finds it impossible to digest thoroughly the available material before making his decisions. What he needs is some technique that will furnish him with all the information bearing on a particular problem in a manner that is easily comprehended. The purpose of this paper is to describe a relativity scale for portraying health needs and services which is designed to meet this need.[5]

In developing the scale it has been assumed that comparisons with other similar and representative communities in terms of both problems and services are valuable aids in administrative procedure. It is further assumed that for many purposes the rank of a community among other similar communities for a given index (i. e., maternal mortality, per capita expenditures, or percent of children immunized) is as useful for interpretative purposes as the actual numerical value of the index. This assumption is believed to be valid for it is the one frequently used to show the significance of a given index to a lay audience. For example, a county health officer in defending his request for additional funds may say, "Ninety percent, or 9 out of every 10 organized counties in the country spend more for public health than we do," or, in deciding to increase the attention given to tuberculosis, he may observe that the tuberculosis mortality in his county is the third highest in the country. Such statements of rank among other comparable communities are frequently much more meaningful than the exact figures such as 32 cents per capita expenditures or 98 tuberculosis deaths per 100,000 population.

The technique herein proposed is essentially a procedure whereby the actual problems or accomplishments of a community as shown by any health index, i. e., mortality rates, ratios of service to population,

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[4] Standards have been proposed by the Committee on Administrative Practice of the American Public Health Association and have received wide acceptance, but they have never been considered as final or absolute standards.

[5] The Appraisal Form for Local Health Work designed by the Committee on Administrative Practice of the American Public Health Association is a valuable aid to health officers in planning and evaluating their programs. The scale described herein supplements the functions of the Appraisal Form in that it provides a relatively simple, graphic method of presenting the health picture of a community, including both its problems and services designed to attack these problems, as compared with the health picture of other communities. The relativity scale has the same limitations as the Appraisal Form in that quantitative indices are not always the best method of depicting health needs and health department accomplishments. However, appropriate interpretation of the graphs can overcome this weakness to a considerable extent.

and the like, may be interpreted as the rank among other communities for that index. By this method, indices with widely different numerical values are reduced to a scale that is directly comparable from index to index, for they show the number of communities that have smaller indices than those for the one under consideration. Even such diverse indices as physicians per 100,000 population, per capita expenditures for selected public health activities, number of serodiagnostic tests per case of syphilis, specific mortality or morbidity rates, or population per individual worker, are reduced to relative ranks so that the various ratings are commensurable.

In order to be able to determine how a community ranks among other communities on the basis of any health index, it is, of course, necessary to have data on the index from all the other communities under consideration. Once data on any index are obtained they can first be arranged in order from low to high. To give a concrete example of the procedure, data on the infant mortality rates of the 74 counties participating in the 1937 Rural Health Conservation

TABLE 1.—*Percentage of communities with smaller infant mortality rates*

Infant mortality rate	Percent with smaller rates [1]	Infant mortality rate	Percent with smaller rates [1]
11	0.7	51	51.3
12	2.0	51	
14	3.4	53	54.1
22	4.7	53	
23	6.1	56	56.1
25	7.4	57	57.4
26	8.8	59	58.8
28	11.5	60	61.5
28		60	
28		60	
30	14.2	61	64.2
31	16.2	62	65.5
31		63	67.6
32	18.2	63	
33	19.6	67	69.6
35	21.6	68	70.9
35		70	73.0
36	24.3	70	
36		71	75.6
37	26.3	71	
38	27.7	72	77.7
40	29.0	75	79.0
41	31.0	76	80.4
41		78	81.7
44	34.4	79	83.8
44		79	
44		81	85.8
45	37.3	84	87.1
45		85	88.5
46	40.5	87	89.8
46		88	91.8
47	42.5	88	
49	45.2	91	93.9
49		92	95.2
49		94	96.6
50	48.6	103	97.9
50		112	90.2

[1] It is recognized that mathematical precision would require that this column be headed as "Percentage with rates equal to or less than the given rate" and that the first percentage should be 1/N Since, however, the technique is to be used practically rather than in any strict mathematical sense, the small error introduced by the simplification of terminology seems to be justified. Furthermore, since it is desirable to have the percentage interpretable both directly and as the complement, i. e., percentage with larger indices, the first value is ½/N rather than 1/N.

Contest of the American Public Health Association are presented in table 1.[6]

With the data so arranged it is possible to determine how the infant mortality rate for any one county compares with that of all the others. For example, a county with a rate of 40 has a higher rate than 21 of the 74 counties listed. Such a statement, though readily understood, is somewhat cumbersome, since the number of counties in the total sample must always be given.

For convenience of interpretation and universal application, it is possible to convert such statements of relative standing into percentile ranks. Thus, 29 percent of the communities have infant mortality rates smaller than 40.[7] These percentile ranks represent a scale ranging from 0 to 100. Each point on this scale is read as the percentage of communities with indices smaller than a given community's index. (The scale can also be read as the percentage of communities with indices larger than a given community's index, but, for simplicity of presentation, preference is given to percentage of communities with smaller indices.) Such scales can be constructed for any type of index, no matter what it is, so long as comparable data can be obtained from a number of representative communities as a basis for determining the percentile ranks.

Since the scale values so derived are comparable, it is possible to chart the various indices for a given community on a graph using a single scale. The indices under consideration for a community may be listed in a column on the extreme left. The computed value of the indices may be entered in the column to the left of the graphic presentation. For each index a percentile rank (percentage of communities with smaller indices) may be obtained from a table similar to table 1 which gives the percentage values for infant mortality. These percentile values can then be represented as vertical lines under the appropriate value on the scale appearing at the top of the graph. (See figs. 1 and 2.)

To illustrate the operation of the technique, a number of indices for two county health departments are charted in figures 1 and 2. The data were obtained from the reports sent in by the counties entering the 1937 Rural Health Conservation Contest. Indices were computed from the data and tabulations similar to those given in table 1 were made for each index. Then the data from two of the counties reporting were charted in figures 1 and 2. For example, in figure 1 the infant mortality rate is 26. Reference to table 1 indi-

[6] The courtesy and cooperation of the Rural Health Conservation Contest Committee in permitting data on the counties to be used for this paper is gratefully acknowledged. Special thanks are due to Miss Cecile Tonnele, secretary of the committee, who directed some of the preliminary tabulations.

[7] The reason for the slight difference in percent (29) given above and 28, which would be obtained by expressing 21 as a percentage of 74, is explained in the footnote to table 1.

cates that 9 percent of the communities have smaller indices, and therefore a short vertical line has been drawn on the graph underneath the value 9 and opposite infant mortality.

Because of limitations in printing, the illustrative graphs contain only a few of the many indices that might be used. In actual practice, however, the technique places no restriction on the number of indices that may be developed and charted nor does it limit in any way the order in which the indices are grouped on the graph.

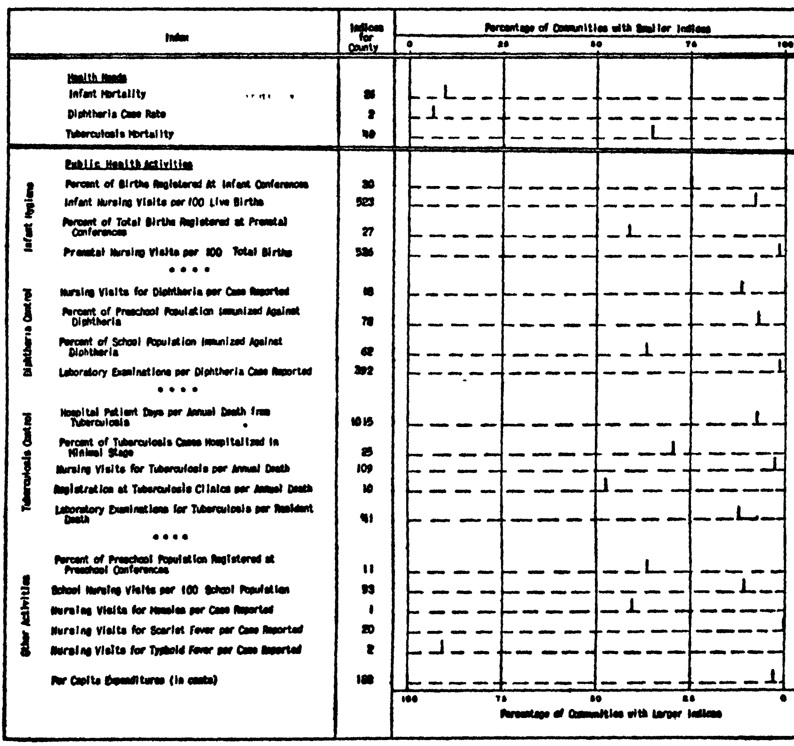

FIGURE 1.—Relativity scale showing health needs in relation to health program (program above average).

In making the selection of data to be charted, no attempt has been made to include all the indices on health needs nor to represent all phases of health department activities. Neither are the data appearing in the figures to be considered the most important indices for administrative purposes, for the importance of data is determined by the problems with which a health officer is faced. The indices do represent, however, some of the more commonly mentioned measures and as such will demonstrate the usefulness of the graphic method.

The charts present 3 indices of specific health problems or needs, 18 indices of health department activities, and 1 over-all item of expenditures for activities constituting the local health department program.

It should be stated at the outset that the indices having to do with need are usually morbidity and mortality rates. For these it is highly desirable that the indices be small. For the remaining items it is usually considered desirable to have high indices. Despite this inconsistency in interpretation there is a value in having the indices for health needs on the same scale as the indices for health services. For example, if tuberculosis mortality is low, then there may be reason to have fairly low values in the indices of service for tuberculosis control.

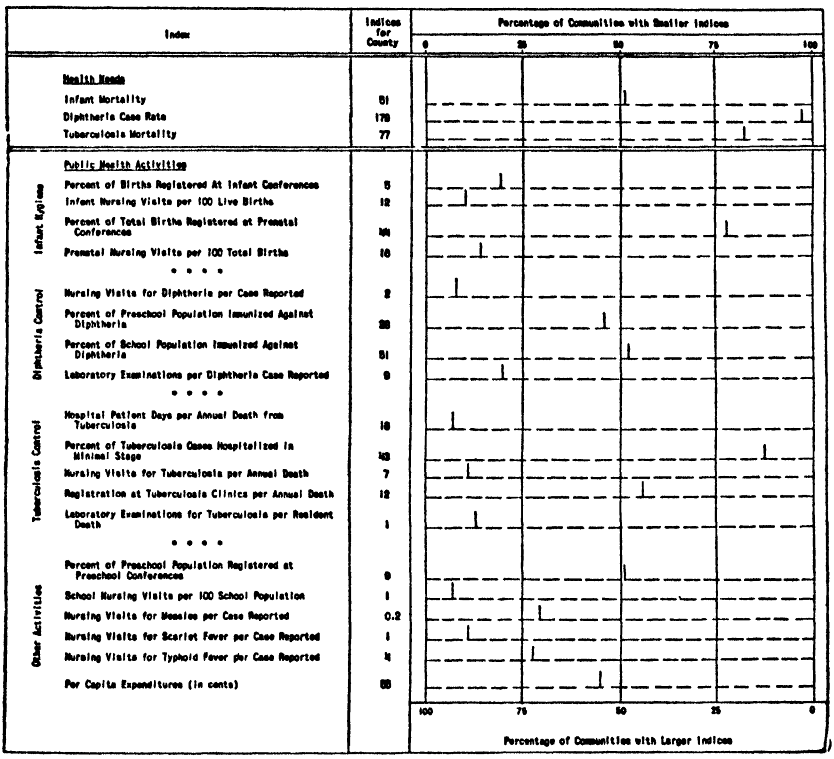

FIGURE 2.—Relativity scale showing health needs in relation to health program (program below average).

The same is true for other health problems. However, to indicate the difference in interpretation, a heavy double line has been drawn to separate the indices on health needs from the other indices.

As illustrative of the type of information to be gleaned from the graphs, a few observations that are immediately apparent in figure 1 are given below.

On the whole, the health program of the county charted in figure 1 is well above the average. The level of the department's activities is above the average in practically all the indices charted and only 3 percent of the counties have a higher per capita expenditure. In terms of health problems the county also shows a fairly favorable

status. Two of the indices, infant mortality and diphtheria incidence, show that the county ranks among the 10 percent of counties having relatively low infant mortality and diphtheria incidence rates. Only in tuberculosis mortality does the county show a need that is greater than the average of other counties. A more careful examination of the indices of health activities reveals that, in comparison with other counties, this county gives little attention to nursing visits for typhoid fever. Likewise, the index of medical service for tuberculosis control (number of individuals registered at tuberculosis clinics per annual death) is the next lowest index, and the percent of tuberculosis cases hospitalized in the minimal stage is somewhat lower than the other indices of activity for tuberculosis control. These observations immediately suggest the questions: Is it possible that this lower amount of medical attention for tuberculous patients may be responsible for the unsatisfactory tuberculosis rate? Might it not be more effective to rearrange the tuberculosis control program to give more service along these lines? Perhaps less attention could be given to infant hygiene activities, since these are being conducted on a relatively high plane, and the infant mortality rate is extremely low in comparison with other counties. Such shifting would make it possible to concentrate more on the tuberculosis problem.

In figure 2 the opposite picture is seen. Although the per capita expenditures for the health-department program approximate the average for all counties reporting, yet practically all of the indices appearing on the graph are much below average. Can it be that this county is expending its resources on other activities than those charted, or is it merely getting less service for its money? Two of the three problems included under health needs (tuberculosis and diphtheria) are outstandingly serious, so far as comparison with other counties is concerned. The other, infant mortality, is exactly average. Data on the program of activities show a very unbalanced program. For example, a relatively large proportion of tuberculosis cases are hospitalized in the minimal stage, yet over 90 percent of the counties provide more total patient days of hospitalization for tuberculosis than does this county. (Unfortunately, data on case-finding procedures could not be included in the graph.) The amount of ambulatory medical attention given tuberculosis patients in terms of registration at clinics is greater in this county than in the one shown in figure 1, yet the number of nursing visits is relatively low. In the control of diphtheria, which is an outstanding problem, the county gives relatively more emphasis to immunization of the school child than of the preschool child, and very little nursing service to the cases reported. These facts in themselves suggest reconsideration of the program.

It is unnecessary to analyze further the type of information that

can be obtained easily from data presented in this manner. The above would seem to be sufficient to show the possibilities of the method.

After a graph showing all the problems and activities has been prepared, the indices can be reassembled according to any particular grouping a health officer may wish to study. For example, he may group all the indices on maternal and child hygiene on one graph for a study of that program. He may assemble all the nursing activities on a single chart as a basis for discussing the nursing program with his nurses. Thus the technique is sufficiently flexible to permit its use in any meaningful combination of indices in which the health officer may be interested.

ADVANTAGES OF THE RELATIVITY SCALE

The method does not meet all needs but it does have a number of advantages for the careful planning and administration of a health program. Among these are the following:

1. The universally applicable and comparable scale makes possible comparisons between any number of indices for a community.
2. By presenting the indices on health problems of a community graphically on one chart, a health officer can determine the relative severity of the several problems in his community as compared with other communities.
3. By grouping the indices of health services on one chart, a health officer may be able to judge the degree to which he is conducting a balanced program. (Balance is here defined as the extent to which a community maintains about the same relative standing in all of its various activities.)
4. By grouping the indices of activities focused on specific problems with the index or indices of those problems, a health officer may judge whether his program is concentrating on the urgent problems or is neglecting them for some less severe condition. In the event any problem is shown to be serious and the activities focused on that problem are not as intensive as for some less serious problem, he can modify his program in terms of the revealed need.
5. The procedure permits of a graphic presentation of social, economic, and other community factors along with indices of health problems as a means of studying the relation of such factors to the health problems.
6. The standards are not fixed arbitrarily. The scale values are determined by performance and are subject to alteration as rapidly as performance changes. Each State may develop its own series of standards if it so desires. In addition, some central agency, either official or private, should prepare annually standards for the country as a whole, based on the performance of the past year. Such standards would permit comparison with other counties or communities both within the State and for the entire country. However, they would not imply adequacy of program, for they merely indicate what other departments are doing.

OTHER USES OF THE RELATIVITY SCALE

In the preceding illustrations, the advantages of the scale to the health officer in understanding the health needs of his community and in focusing his program on those needs have been shown. The health officer will also find the graph a useful device in explaining the health program to a lay audience, for it translates the data into easily understood terms. A well-prepared graph of this nature, showing a specific problem as being paramount, coupled with an inadequate program to meet that problem, owing to lack of funds, should be helpful in an attempt to secure funds to carry on proposed activities to meet the problem.

To the State or district supervisor the technique furnishes a cue to the strengths and weaknesses in a given county program. His services can be more specifically directed towards the places where his advice is most useful, and the charted data will assist him in discussing the problems with the operating personnel.

For the Rural Health Conservation Contest Committee of the American Public Health Association the scale offers an easily comprehended method of reporting back to the counties. Verbal comments on various relationships within the activities will be stimulated by the graphic display of the situation discussed.

It is believed that, as the technique becomes more thoroughly understood by health officers, and more extensively used, it will help to improve the accuracy of record keeping. Because of the way in which the scale operates, errors in record keeping tend to be revealed as imbalance of program or as improbable indices. Thus, proper supervision and use of the indices will help to improve the accuracy of the data charted on the graph.

SUMMARY

A graphical method for making health department records more useful for administrative purposes has been described. It is based on the principle of translating indices of health needs and health problems into a scale that indicates a community's relative standing among other communities in any given index, thus making possible immediate comparisons of one community with others. Although the technique should be an aid to administrators, it is not a panacea, for, like all devices, it will not replace intelligent consideration of problems before final decisions are made.

THE EXPERIMENTAL TRANSMISSION OF POLIOMYELITIS TO THE EASTERN COTTON RAT, *SIGMODON HISPIDUS HISPIDUS*

By CHARLES ARMSTRONG, *Senior Surgeon, Division of Infectious Diseases, National Institute of Health, United States Public Health Service*

Through the courtesy of Dr. Max Peet, of the Department of Surgery, University of Michigan, we received on August 28, 1937, a sample of brain and cord from an 18-year old boy, one of several bulbar cases of poliomyelitis which occurred at Lansing, Mich., during that summer. A strain of virus was recovered from the material which has now been through 15 monkey passages and which clinically, and pathologically as reported by Surgeon R. D. Lillie, is apparently a strain of poliomyelitis. Neutralization tests with this virus have not been done.

On November 8, 1937, several species of rodents, including a cotton rat received through the courtesy of Dr. A. Packchanian, of the National Institute of Health, were inoculated with a fourth monkey passage of the virus. The cotton rat remained apparently well until the twenty-fifth day, when it appeared nervous and tremulous. On the following day it was paralyzed in both hind legs and was sacrificed.

Pathologist R. D. Lillie, who has made all the pathological studies, reported "polioencephalitis." Eleven cotton rats were inoculated with this strain of poliomyelitis virus during the winter of 1938, of which rat No. 9, inoculated on February 14, became paralyzed in both hind legs 29 days later. Brain and cord emulsion was passed to rat No. 13 and symptoms appeared on the sixteenth day. On the following day there was paralysis in the right front leg. Attempts at further passage were without success.

Efforts were again made, however, during the poliomyelitis season of 1939, and up to the time of this report the Lansing strain of virus has been carried in series through 7 cotton rat transfers and animals of the eighth transfer are developing symptoms. Rat brain and cord from the second and fifth passages conveyed typical poliomyelitis symptoms when introduced into monkeys. The details of these transfers are shown in table 1. Further transfers are under way.

The inoculum utilized was a 5 percent suspension of brain and cord and the dosage has been approximately 0.06 cc. intracerebrally, 0.06 cc. intranasally, and 0.25 cc. subcutaneously, for each animal. The minimal infective dose has not been determined, since it was necessary to conserve our limited supply of cotton rats and we preferred, moreover, to wait until the virus had become somewhat adapted to the host. The virus at the sixth serial transfer seems to be gaining in virulence. A more detailed report of the results will be made later.

TABLE 1.—*Results of transfers of virus to cotton rats and monkeys*

Transfer	Number of animals inoculated		Date of inoculation (1939)	Incubation period, in days, of animals paralyzed	Number of animals not paralyzed	Pathology
	Cotton rats	Monkeys				
1	3	------	July 12	14	2	Polioencephalitis.
2	3	------	July 27	4, 8, 13	0	Do.
3	7	------	Aug. 8	8, 8, 9, 11, 13	[1] 2	Do.
3	--------	1	Aug. 11	4, complete paralysis sixth day.	0	Severe poliomyelitis.
4	5	------	Aug. 16	5, 6, 7, 9	[1] 1	Do.
5	7	------	Aug. 26	6, 6, 8, 8, 12	[1] 2	Do.
6	4	------	Aug. 31	6, 6, 7	[2] 1	Do.
6	--------	1	do.	7, paralysis both arms	0	Do.
7	4	------	Sept. 7	5, 5, 6, 7	0	Do.

[1] 1 rat that failed to react had been previously inoculated with the same strain of virus without paralysis eveloping.
[2] This rat had been twice previously inoculated without paralysis developing.

Successful transmission to date has been secured with the Lansing strain of virus only. Limited attempts at transmission were carried out with two strains of virus from Niagara Falls and with P. M. virus during the winter of 1938, at which time we also had only failures with the strain which now is giving results.

The first symptoms noted in the cotton rats consist of a roughened appearance of the fur and a tendency to react by violent jumping when agitated. Paralysis of a flaccid type has developed in all animals which we have considered as affected. The legs may be paralyzed in all combinations and respiratory difficulty has developed in several, with the respiratory rate falling as low as 30 per minute in some. Two rats with respiratory failure died; the others were etherized.

A number of other rodents have been inoculated with the virus utilized in the course of this study, including groups of Swiss mice with successive transfers, but no positive results have been secured in animals other than the cotton rats.[1]

The eastern cotton rat is not vicious and it multiplies readily in captivity. It is hoped, therefore, that when a sufficient supply becomes available and the most susceptible age is determined the cotton rat may prove to be a cheap, convenient, and useful laboratory animal for the study of poliomyelitis.

It is conceivable, however, that the results secured may be due to some peculiarities of this particular strain of virus.

ACKNOWLEDGMENTS

The author desires to express his indebtedness to Dr. A. Packchanian, of the National Institute of Health, from whom the earlier supplies of rodents were secured, and to Passed Assistant Surgeon A. G.

[1] In 1937 two wood rats, *Neotoma albigula albigula*, were believed to have died of experimental poliomyelitis, but these results have not been confirmed.

Gilliam, Edward B. Chamberlain, Jr., M. T. Coleman, and Mammalogist E. B. Chamberlain for aid in securing and identifying rodents for the later studies.

RELAPSING FEVER: THE GUINEA PIG AS AN EXPERIMENTAL ANIMAL IN THE STUDY OF *ORNITHODOROS TURICATA*, *O. PARKERI*, AND *O. HERMSI* STRAINS OF SPIROCHETES [1]

By Gordon E. Davis, *Bacteriologist, United States Public Health Service*

Incident to recent studies on relapsing fever spirochetes the following observations have been made on the susceptibility of the guinea pig to tick-transmitted strains indigenous to the United States.

The following strains of spirochetes were used in these studies: *Ornithodoros turicata* Texas 1 and 2, *O. turicata* Kansas 1 and 2, *O. parkeri* Montana, *O. parkeri* Wyoming 1, 2, 3, and 4, and *O. hermsi* California. The *turicata* Texas 1 strain was received October 1935, in ticks from Prof. Hardy Kemp, of the Baylor University Medical School, Dallas, Tex.; the *turicata* Texas 2 strain was recovered from ticks collected in August 1937, in Gray County, Tex., by Assistant Entomologist Glen M. Kohls; the *turicata* Kansas strains were recovered from ticks collected in August and September 1936, in Clark County, Kans., by the writer; the *parkeri* Montana strain was from ticks collected in September 1936, in Beaverhead County, Mont., by Assistant Parasitologist Wm. L. Jellison; the *parkeri* Wyoming strains 1 to 4 were from ticks collected in 1937 and 1938, in Sweetwater County, Wyo., by the writer; and the *hermsi* strain was received March 30, 1937, in white mice from Dr. K. F. Meyer, Director of the Hooper Foundation, San Francisco, Calif. All strains have been maintained in ticks of their respective species. The *O. hermsi* ticks were received in December 1936 from Dr. Charles Wheeler, also of the Hooper Foundation.

The strains were introduced into the test guinea pigs by the bite of infected ticks and the injection of infectious rat blood. If two guinea pigs received rat blood of any strain, one was injected subcutaneously, the other intraperitoneally. If only one guinea pig was used, the route of injection is noted in the text. The amount of rat blood employed was 0.5 cc. unless otherwise stated. When ticks were used, they were allowed to feed to satiation. Blood films from each test guinea pig were examined daily, the period of observation varying in the several experiments. The shortest period was 15 days, the longest 31. All films were stained with Giemsa.

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[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.

Ornithodoros turicata STRAINS

GUINEA PIGS INFECTED BY INJECTING WHITE RAT BLOOD (FIG. 1)

Kansas 1 strain.—On March 8, 1938, two guinea pigs (A19310 and A19311) were injected. The subcutaneously injected guinea pig remained afebrile, but spirochetes appeared in the peripheral blood on the second day and on each day from the seventh to the eleventh, inclusive. The guinea pig injected intraperitoneally had temperatures of 39.8° and 40.0° C. on the seventh and ninth days, respectively, and spirochetes appeared in the peripheral blood on the second and on the seventh, eighth, and ninth days. Each guinea pig had one relapse.

Kansas 2 strain.—On March 8 two guinea pigs (A19291 and A19312)

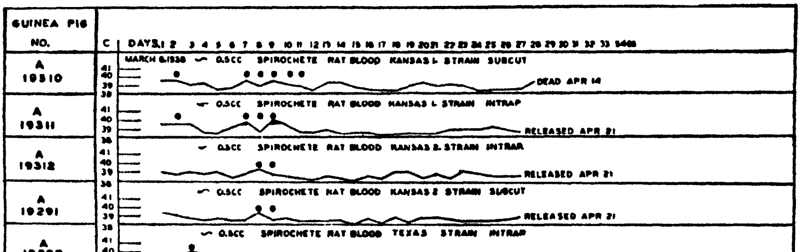

FIGURE 1.—*O. turicata* strains. Blood transfers.

were injected. Spirochetes appeared in both on the eighth and the ninth days. Neither guinea pig showed fever or any relapse.

Texas strain 1.—On March 8 two guinea pigs (A19293 and A19292) were injected. On the third day the temperatures were 39.6° and 40.0° C., respectively, and spirochetes were demonstrated in the blood of both animals. There were no relapses.

GUINEA PIGS INFECTED BY TICK FEEDING (FIG. 2)

Kansas 1 strain.—On April 20 nymphal *O. turicata* No. 32 engorged on guinea pig A19991. The temperature of the guinea pig was 40.0° C. on the seventh and thirteenth days. Spirochetes were demonstrated in the peripheral blood on both days. There was one relapse.

On May 28 female *turicata* No. 32 engorged on guinea pig A98265. Spirochetes appeared on the seventh and fifteenth days, with accompanying temperatures of 39.6° and 39.5° C., respectively. There was one relapse.

On May 28 nymphal *turicata* No. 18 engorged on guinea pig A19992. Temperatures of 40.4° and 40.6° C. were recorded on the ninth and fifteenth days, respectively, and spirochetes were demonstrated on both dates. There was one relapse.

On May 30 female *turicata* No. 18 engorged on guinea pig A98266. On the seventh, eighth, and fifteenth days there were elevations of temperature to 40.0°, 40.0°, and 40.4° C., respectively. Spirochetes were present with each rise in temperature. There was one relapse.

On May 28 female *turicata* No. 9 engorged on guinea pig A98264. There were temperatures of 40.6°, 39.8°, and 39.6° C. on the fifth, ninth, and tenth days, respectively. Spirochetes were not found

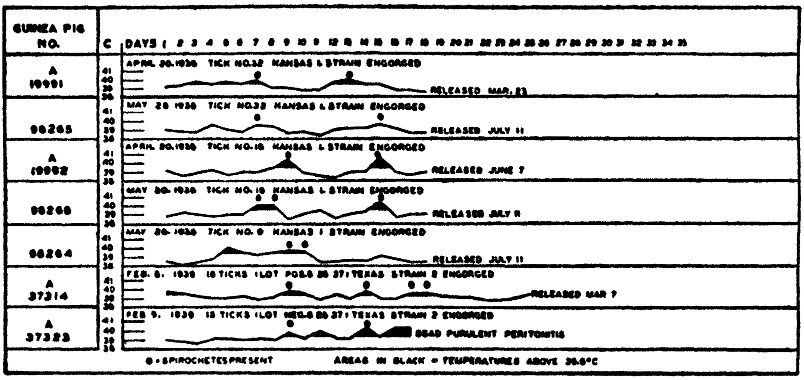

FIGURE 2.—*O. turicata* strains. Tick feedings.

during the first rise in temperature, but were present on the ninth and tenth days. One relapse occurred.

Texas strain 2.—On February 8, 1939, 18 ticks which had infected a rat on August 25, 1937, and had not since been given an opportunity to feed were placed in a feeding capsule on guinea pig A37314. The guinea pig showed definite fever on the ninth (40.0°), the fourteenth (40.0°), and the seventeenth and eighteenth days (39.8°, 39.8° C.). Spirochetes were observed at each rise in temperature. There were two relapses.

On February 9 a lot of 15 ticks which had failed to infect a white rat on August 25, 1937, and had not since been given an opportunity to feed were placed in a feeding capsule on guinea pig A37323. Spirochetes were present on the ninth and fourteenth days, with temperatures of 39.8° and 40.4° C., respectively. There was one relapse.

O. parkeri STRAINS

GUINEA PIGS RECEIVING BLOOD FROM INFECTED WHITE RATS (FIG. 3)

Montana strain.—On March 3, 1938, two guinea pigs (A19309 and A19308) were injected. In the animal injected subcutaneously spirochetes were present from the sixth to the ninth days (temperatures 40.4°, 39.6°, 39.4°, 39.8° C.) and again on the eleventh and twelfth days (39.6°, 39.8° C.). In the animal injected intraperitoneally spirochetes appeared on the seventh and eighth days (40.6°,

39.8° C.) and on the tenth and eleventh days (40.2°, 39.9° C.). One relapse occurred.

Wyoming 1 strain.—On March 8 two guinea pigs (A19294 and A19295) were injected. In the subcutaneously injected guinea pig spirochetes were demonstrated on the third to fifth (40.4°, 40.4°, 40.0°C.) and ninth days (39.4°). In the second guinea pig spirochetes were demonstrated on the fourth, fifth (40.0°, 40.4° C.) and eleventh to thirteenth days (40.2°, 39.0°, 41.0° C.). Each guinea pig had one relapse.

Wyoming 2 strain.—On January 31 guinea pig A12536 received a

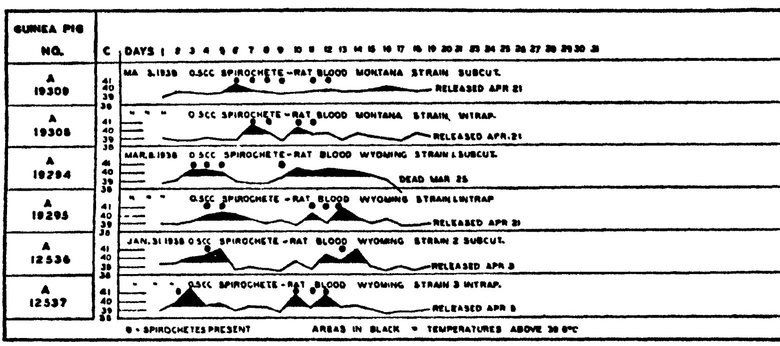

FIGURE 3.—*O. parkeri* strains. Blood transfer.

subcutaneous injection. Spirochetes were demonstrated on the fourth and thirteenth days with temperatures of 40.2° and 39.8° C., respectively. One relapse occurred.

Wyoming 3 strain.—On January 31 guinea pig A12537 received an intraperitoneal injection. Spirochetes were present on the second (39.8° C.) and from the tenth to twelfth days (40.8°, 39.2°, 40.8° C.). There was one relapse.

GUINEA PIGS INFECTED BY TICK FEEDING (FIG. 4)

Montana strain.—On July 21, 1938, female *parkeri* No. 5 engorged on guinea pig A25540. There were 2 febrile periods, viz, the sixth

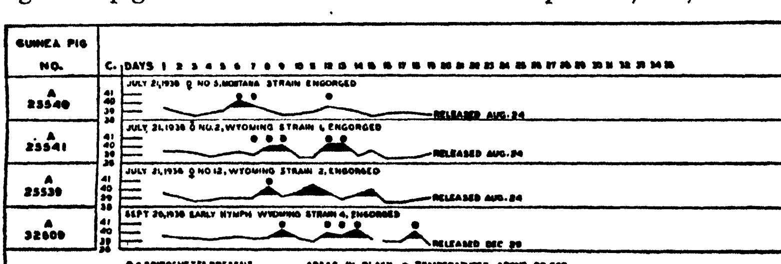

FIGURE 4.—*O. parkeri* strains. Tick feedings.

and seventh days (40.2° and 39.6°) and the thirteenth day (39.6° C.). Spirochetes were present on each of these days. One relapse occurred.

Wyoming 1 strain.—On July 21 male *parkeri* No. 2 engorged on guinea pig A25541. Temperatures were 39.8°, 40.0°, and 40.2° C. on the seventh, eighth, and ninth days, respectively, and 40.2° and 40.4° C. on the twelfth and thirteenth days. Spirochetes were present during each febrile period. There was one relapse.

Wyoming strain 2.—On July 21 female *parkeri* No. 12 engorged on guinea pig A25539. Spirochetes were found only on the eighth day when a temperature of 40.4° C. was present. However, two subsequent febrile periods suggest that spirochetes may have been present later.

Wyoming strain 4.—On September 26 a *parkeri* early nymph engorged on guinea pig A32609. Temperatures of 40.4°, 40.0°, 39.8°, 40.4°, and 40.2° C. were recorded on the ninth, twelfth, thirteenth, fourteenth, and eighteenth days, respectively. Spirochetes were demonstrated during each rise in temperature, indicating two relapses.

O. hermsi STRAINS

GUINEA PIGS RECEIVING BLOOD FROM INFECTED WHITE RATS (FIG. 5)

California strain.—On March 23, 1938, guinea pigs A19940 and A19939 were injected. In the subcutaneously injected guinea pig

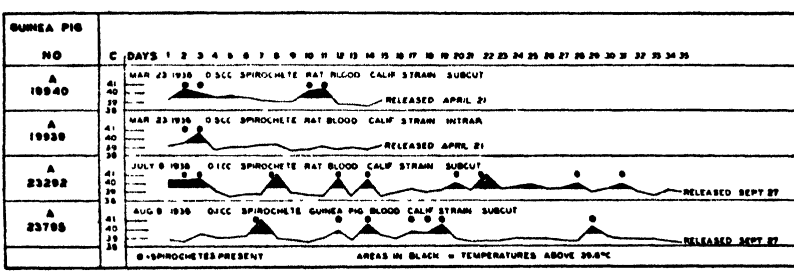

FIGURE 5.—*O. hermsi* strains. Blood transfers.

there were 2 febrile periods, viz, the second and third days (40.4° and 40.0° C.) and the tenth and eleventh days (40.2° and 40.4° C.). Spirochetes were demonstrated on all 4 days. One relapse occurred. In the second guinea pig spirochetes were found only on the second and third days (39.6°, 40.6° C.), There was no apparent relapse.

On July 8 guinea pig A23292 received 0.1 cc. rat blood subcutaneously. There were six febrile periods, viz, on the second and third (40.4°, 40.6° C.), the eighth (41.0° C.), the twelfth to fourteenth (40.6°, 40.0°, 40.0° C.), the twentieth and twenty-second (40.0°, 41.0° C.), the twenty-fourth and twenty-fifth (39.8°, 40.0° C.), and the twenty-eighth and thirty-first days (40.0°, 40.0° C.). Spirochetes were demonstrated on all but the twenty-fourth and twenty-fifth days. There were four definite relapses.

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On August 9 guinea pig A23795 received 0.1 cc. of blood from the above guinea pig A23292 subcutaneously. Spirochetes were demonstrated at each rise in temperature, viz, on the seventh (41.0° C.), the twelfth and fourteenth (39.8°, 40.4° C.), the seventeenth, eighteenth, and nineteenth (39.8°, 39.6°, 40.6° C.), and the twenty-ninth days (40.2° C.). Three definite relapses occurred.

GUINEA PIGS INFECTED BY TICK FEEDING (FIG. 6)

California strain.—On May 12, June 9, and June 27, 1938, *O. hermsi* male No. 6D engorged on guinea pigs 98203, 98317, and A23208 respectively. The first guinea pig had three febrile periods, viz, the sixth and seventh (40.2°, 40.8° C.), the fifteenth and sixteenth (39.7°, 39.8° C.), and the twenty-first and twenty-second days (40.2°,

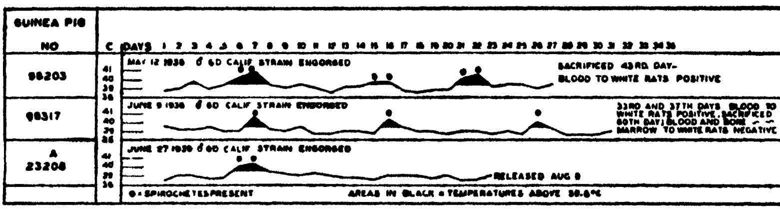

FIGURE 6.—*O. hermsi.* Tick feedings.

40.5° C.). Two relapses occurred. Spirochetes were present during each febrile period. Forty-three days following tick engorgement spirochetes were recovered from blood, brain, and bone marrow by rat inoculation.

The second guinea pig had temperatures of 40.6°, 40.4°, and 40.0° C. on the seventh, sixteenth, and twenty-sixth days. There were two relapses and spirochetes were demonstrated during each. White rats injected with the blood and bone marrow taken from these guinea pigs 50 and 60 days, respectively, after tick feeding did not show spirochetes.

In the third guinea pig fever was present only on the sixth and seventh days (40.0°, 40.4° C.). Spirochetes were present on both days. On the eighteenth day (39.0° C.) blood from this guinea pig was injected into a white rat in which spirochetes were later demonstrated. Spirochetes were not recovered by injecting rats with blood taken on the thirty-second day or with brain tissue and bone marrow taken on the forty-second day. In several subsequent feedings on rats it was shown that this tick had lost its infectivity.

DISCUSSION

Other workers using native strains of relapsing fever spirochetes have also reported on the susceptibility of guinea pigs. Kemp, Moursund, and Wright (*1*), using a *turicata* (Texas) strain, failed to produce

infections uniformly by either intraperitoneal or intravenous inoculations. Coleman (*2*) has summarized his experience with *hermsi* (California) strains as follows: "While spirochetes are usually present, in certain animals the cardiac blood examined in thick film every day for 22 to 23 days after inoculation never revealed spirochetes though it was infectious for mice." Beck (*3*), who also worked with a *hermsi* strain, found that guinea pigs are not quite as refractory to rodent blood as to human blood, and concludes that they are of no value in the laboratory diagnosis of relapsing fever.

In the studies herein reported, the sources of spirochetes were white rat blood and ticks. No blood from human patients or wild rodents was used. Ten strains, representing 3 species of ticks, were employed and all 30 test guinea pigs became infected. As judged from the demonstrated presence of spirochetes in the peripheral blood, 7 guinea pigs had no relapses, 17 had 1, 4 had 2, 1 had 3, and 1 had 4. In the case of the *turicata* strains, figures 1 and 2 indicate that more definite results were obtained with ticks than from rat blood. However, this was not true of the *parkeri* or *hermsi* strains. The data shown in figure 5 suggest that a small amount of blood injected subcutaneously may result in a more prolonged infection than larger amounts. Figure 6 gives the results of three successive feedings of the same male tick over a period of 45 days. The records suggest that the strain carried by this tick was progressively losing its invasiveness. Weight is added to the assumption by the fact that further feeding on white rats by this tick failed to cause infection.

CONCLUSIONS

Guinea pigs have been shown to be susceptible to strains of relapsing fever spirochetes transmitted by *Ornithodoros turicata, O. parkeri,* and *O. hermsi.* These results suggest that the guinea pig may be a useful adjunct to white rats and white mice in the study of strains of relapsing fever spirochetes native to the United States.

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b. ——— Relapsing fever in Texas. III. Some notes on the biological characteristics of the causative organism. Am. J. Trop. Med., **14:** 163–179 (1934).

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THE EFFICIENCY OF THE CONDENSATION METHOD FOR SAMPLING CERTAIN VAPORS[1]

By F. H. GOLDMAN, *Associate Chemist*, and J. M. DALLAVALLE, *Passed Assistant Sanitary Engineer, United States Public Health Service*

The condensation method for the sampling of certain vapors has been widely used in industrial hygiene investigations. This method has several advantages over the usual type of absorption apparatus, chief among which may be mentioned simplicity of construction and ease in handling collected samples for analysis. However, the use of condenser-type sampling devices entails several considerations not often given proper attention. For example, extremely cold liquids for freezing out vapors may often reduce collection efficiency rather than increase it. This is due to the sudden formation of extremely fine mist which passes through the apparatus without condensing. Again, the freezing of water vapor, causing a clumping within the collecting tube, may be sufficient to obstruct the flow of air completely. The most practical relationship between length and diameter of tube and the rate of sampling are also little understood.

In this paper the characteristics of the condensation-type sampling device in its simplest and commonest form are discussed. The method described makes use of a U-tube immersed in a freezing mixture of dry ice and methyl alcohol (−78° C.). No attempt is made to relate all variables with the efficiency of collection. The primary purpose of the paper is rather to discuss the limitations of the condensation technique for field investigations in industrial hygiene.

In the experiments described below, two types of vapors, water vapor and bromine, were employed to test the condensation technique of sampling. The vapor pressures of these substances are ideally suited to determine the efficiency of sampling. Their chemical analysis can be accomplished easily and with great precision. It is obvious that substances having high vapor pressures at the freeze-out temperatures will be condensed with less effectiveness than those with low vapor pressures. The physical properties of water vapor and bromine are given in table 1.

TABLE 1.—*Properties of substances used in condensation tests*

Temperature of dry ice and methanol.	−78° C.	Vapor pressure of bromine at 20° C.	173.0 mm. Hg.
Freezing point of water	0° C.	Vapor pressure of bromine at 0° C.	65.9 mm. Hg.
Freezing point of bromine	−7.3° C.	Vapor pressure of bromine at −7.3° C.[1]	44.4 mm. Hg.
Vapor pressure of water at 20° C.	17.5 mm. Hg.		
Vapor pressure of water at 0° C.	4.6 mm. Hg.		
Vapor pressure of water at −78° C.	0.0356 mm. Hg.		

[1] Melting point. Value for vapor pressure at −78° C. not available.

[1] From the Division of Industrial Hygiene, National Institute of Health.

EXPERIMENTAL PROCEDURE

SAMPLING OF WATER VAPOR

The arrangement used for collecting water vapor is illustrated in figure 1. Atmospheric air is drawn by means of the ordinary impinger pump through a sintered glass bubbler containing water at room temperature. The moisture-laden air then passes through a glass U-tube the over-all length of which is 2½ feet. This is a convenient length to bend and appears adequate. Most of the sample is

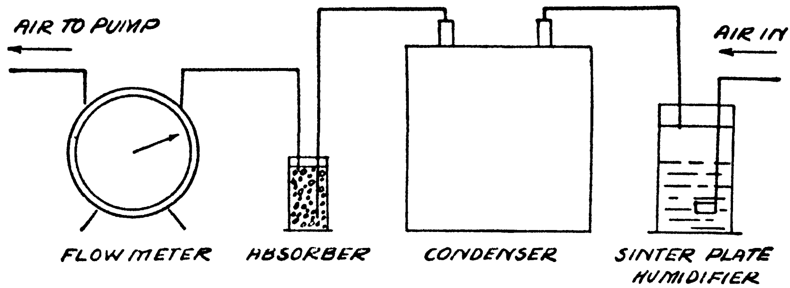

FIGURE 1.—Arrangement of equipment to determine the efficiency of the condenser against water vapor.

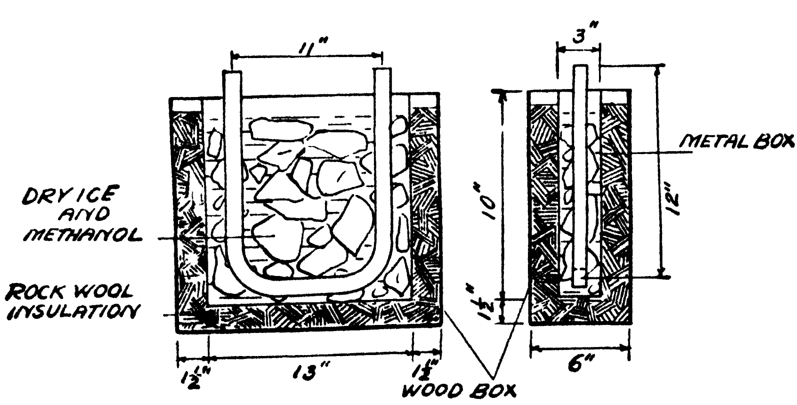

FIGURE 1a.—Design of condenser used in tests.

actually condensed only over a few inches on the inlet side. This tube is immersed in a dry ice-methanol mixture (−78° C.). The air then passes through a tared Fischer absorption tube packed with anhydrous magnesium perchlorate, where any uncondensed vapor is absorbed. The volume of air (dry) is measured by a wet meter.

The test procedure adopted consisted of passing the air sampled through the apparatus shown in figure 1 for a definite time, usually 1 hour, and at the end of this interval replacing the absorption tube. The experiment was carried out with two sets of U-tubes, one 16 mm. and another 21 mm. in inside diameter. The results, shown in table 2 and figure 2, are for runs ranging from 2 to 6 hours.

It is to be noted from the data given in table 2 that the collecting efficiency of water vapor tends to increase with time. This is due to a fine snow which fills the tube and acts as a baffle and filter. At flows exceeding 2 liters per minute, the condensation apparatus is inefficient and the vapor passes the outlet of the U-tube. Runs Nos. 1, 2, and 4 show a high collection of water vapor when the rates of air flow were kept below one liter per minute. The horizontal sections of the

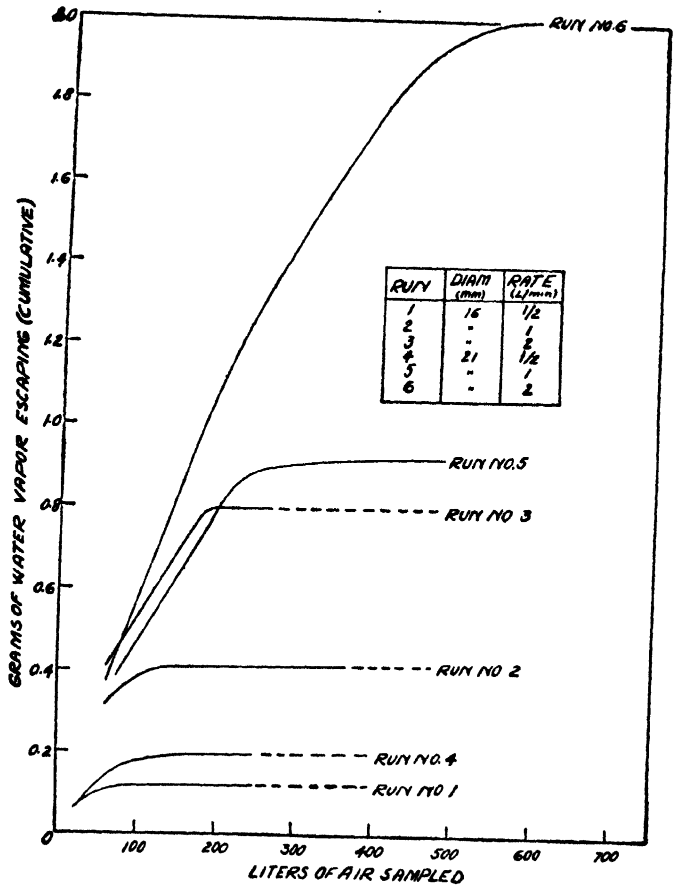

FIGURE 2.—Results of tests made to determine the effectiveness of the condenser apparatus against water vapor.

curve in figure 2 indicate practically no loss of water from the U-tube and, therefore, 100 percent efficiency.

The actual efficiencies are not given in the table, because the total water content of the absorption tube and the U-tube could not be determined accurately under the conditions of these experiments. However, assuming a 200-liter sample and calculating the total amount of moisture in this amount of air at 20° C., we may calculate the probable efficiency of the technique employed. If the air is sat-

TABLE 2.—*Results of water vapor tests by the condensation technique*

Run No.	Inside diameter U tube (mm.)	Rate of flow (liter per minute)	Total time of run (hours)	Cumulative volume of air (liters)	Cumulative water vapor escaping (grams)	Remarks
1	16	½	6	30	0.0798	
				60	.0986	
				92	.1164	
				122	.1164	
				152	.1172	
				182	.1181	
2	16	1	5	63	.3145	
				126	.4052	Tube blocked after another 20 minutes.
				186	.4104	
				250	.4148	
				312	.4148	
3	16	2	2	60	.4073	Tube blocked, rate slowed to 47 liters in last ½ hour.
				182	.7898	
				229	.8028	
4	21	½	6	31	.0671	
				67	.1417	
				97	.1697	
				129	.1873	
				159	.1886	
				190	.1960	
5	21	1	6	72	.3970	
				139	.6005	
				223	.8766	Tube almost completely blocked.
				290	.9073	
				378	.9216	
				455	.9281	
6	21	2	5½	60	.3703	
				182	1.0191	
				305	1.4994	Tube blocked.
				440	1.8025	
				560	2.0046	
				678	2.0109	

urated at this temperature, the concentration of water in it would be 16.9 milligrams per liter. A 200-liter sample of air would then contain 3.4 grams of water. With a 16 mm. tube and sampling at the rate of ½ liter per minute, the total loss of water would amount to 0.1 gram, giving an efficiency of 97 percent. If the rate of sampling is stepped up to 1 liter per minute, then, under these conditions, the efficiency is reduced to 88 percent. Using a 21-mm. tube at ½ liter per minute, the efficiency is 94 percent.

SAMPLING OF BROMINE VAPOR

The efficiency of a 16 mm. U-tube was also tested against bromine. For these runs the set-up was altered, as shown in figure 3. The air was passed over dilute bromine water contained in a glass stoppered bottle. After passing through the U-tube, the air continued through two 250 cc. sintered glass bubblers and then on through the meter and to the pump. The bubblers were filled with 3 percent potassium iodide solution. The amount of iodine liberated by the bromine escaping from the U-tube was determined by titration with N/100 sodium thiosulfate, using starch as an indicator. The results are given in table 3 and figure 4.

It is to be noted that the U-tube is entirely nadequate for the collection of bromine. Bromine freezes at −7.3° C. and boils at 58.8° C. While the freezing point is not greatly below that of water, the vapor

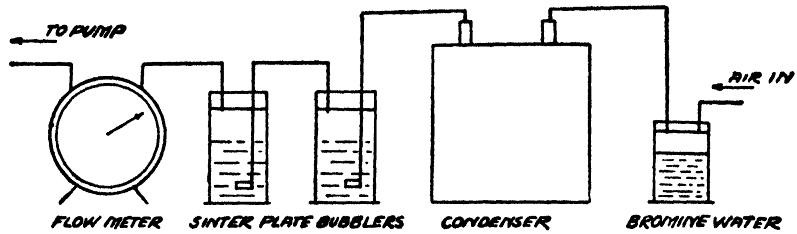

FIGURE 3.—Arrangement of equipment to determine efficiency of condenser against bromine vapor.

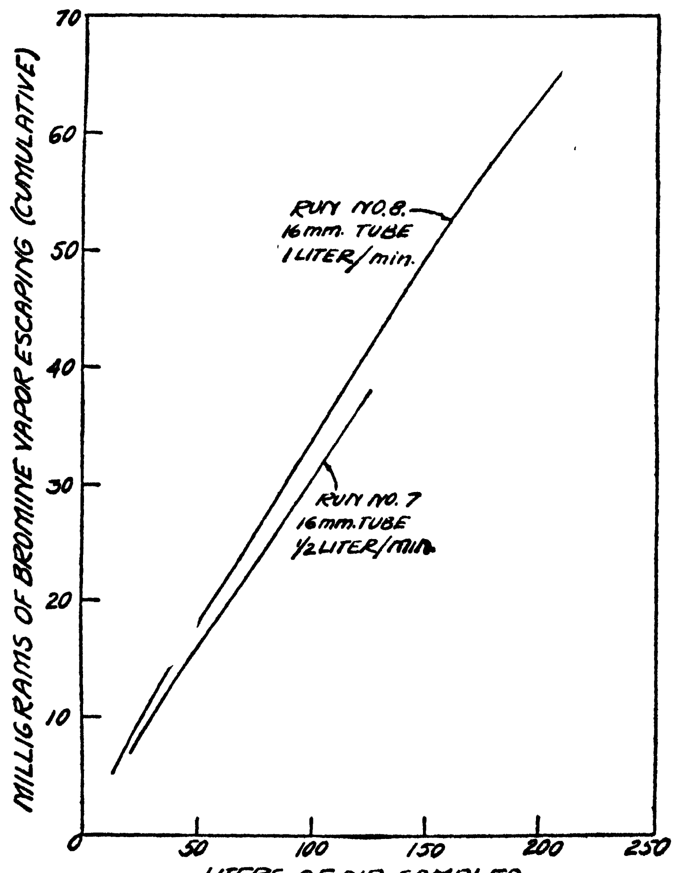

FIGURE 4.—Results of tests made to determine the effectiveness of condenser apparatus against bromine vapor.

pressure is much higher. Thus, the condensation technique described is not adapted to the sampling of substances having a vapor pressure corresponding to bromine (173 mm. at 20° C. and 44.4 mm. at −7.3° C.).

Using a sampling rate of ½ liter per minute, all the bromine is caught in the first bubbler. At 1 liter per minute, only a little over 2 percent is carried into the second bubbler.

TABLE 3.—*Results of bromine vapor tests with condensation technique*

Run No.	Rate of flow (liter per minute)	Total time of run (hours)	Cumulative volume of air (liters)	Cumulative bromine vapor escaping (mg.)	Remarks
7	½	3	30	9.57	7.08 mg. Br left in U-tube at end of run.
			60	18.47	
			90	27.13	
8	1	3½	29	10.72	9.60 mg Br left in U-tube at end of run.
			90	30.30	
			149	48.62	
			209	65.02	0.24 mg. Br/hour found in second bubbler.

CONCLUSIONS

On the basis of the experiments conducted, the following conclusions seem warranted.

1. A condensation method such as the one here described is adequate for the collection of water vapor in air. When a 16-mm. U-tube is used, with sampling at ½ liter per minute for 200 liters, about 97 percent of the moisture is caught. Increasing the rate of sampling to 1 liter per minute lowers the efficiency to about 88 percent. With a 21-mm. U-tube and a sampling rate of ½ liter per minute, about 94 percent of the moisture is caught.

2. Under these same conditions it may be expected that the efficiency of the tube for the collection of substances having vapor pressures comparable to water, or lower, as, for example, mercury vapor, should be very high.

3. Bromine, or substances having comparable vapor pressures, cannot be collected by the condensation method under the conditions of the experiment. However, bromine can be caught completely with a single sintered glass bubbler in potassium iodide solution when sampled at the rate of ½ liter per minute.

4. These experiments indicate definitely that it is necessary to test any sampling device such as the one described here to determine its efficiency for the particular substance to be collected. The sampling rate, the size of the sample, and the size of the U-tube to be used must be taken into account.

DEATHS DURING WEEK ENDED SEPTEMBER 2, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 2, 1939	Corresponding week 1938
Data from 88 large cities of the United States:		
Total deaths	7,017	7,081
Average for 3 prior years	[1] 7,138	
Total deaths, first 35 weeks of year	294,131	287,676
Deaths under 1 year of age	482	501
Average for 3 prior years	[1] 404	
Deaths under 1 year of age, first 35 weeks of year	17,685	18,577
Data from industrial insurance companies:		
Policies in force	66,767,749	68,328,766
Number of death claims	10,388	11,048
Death claims per 1,000 policies in force, annual rate	8.1	8.4
Death claims per 1,000 policies, first 35 weeks of year, annual rate	10.4	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	2	1	----	----	----	----	6	1	1	3
New Hampshire	0	0	0	0	----	----	----	----	0	0	0	0
Vermont	0	0	1	0	----	----	----	----	188	14	1	2
Massachusetts	1	1	3	3	----	----	----	----	15	13	30	15
Rhode Island	0	0	0	0	----	----	----	----	31	4	0	0
Connecticut	0	0	0	1	----	----	----	----	15	5	3	3
MID. ATL.												
New York	5	13	18	18	[1] 1	[1] 1	[1] 1	[1] 3	18	46	74	74
New Jersey	1	1	6	3	4	3	5	5	14	12	13	12
Pennsylvania	5	10	18	21	----	----	----	----	9	17	27	57
E. NO. CEN.												
Ohio	12	15	14	15	1	1	----	2	8	10	12	19
Indiana	28	19	7	12	6	4	14	11	6	4	6	7
Illinois	9	14	11	20	2	3	9	7	9	14	21	21
Michigan [3]	5	5	2	7	----	----	----	----	4	4	13	13
Wisconsin	4	2	2	2	51	29	9	11	39	22	30	30
W. NO. CEN.												
Minnesota	10	5	2	5	4	2	2	----	12	6	13	10
Iowa	4	2	13	5	----	----	5	----	12	6	3	3
Missouri	3	2	15	15	----	----	5	13	0	0	7	6
North Dakota	7	1	0	1	7	1	----	----	7	1	5	5
South Dakota	0	0	2	1	----	----	----	----	15	2	0	0
Nebraska	0	0	0	2	----	----	----	----	4	1	0	1
Kansas	20	7	8	5	----	----	----	1	8	8	4	4

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934-38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934-38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934-38, median
SO. ATL.												
Delaware	0	0	1	0	----	----	----	----	20	1	0	0
Maryland [2]	9	3	4	4	----	----	1	2	3	1	3	4
Dist of Col	8	1	4	4	----	----	2	1	8	1	2	1
Virginia	84	45	38	31	144	77	----	----	9	5	3	8
West Virginia	19	7	10	10	8	3	10	15	3	1	0	2
North Carolina [3]	88	60	79	38	----	----	4	2	3	2	15	9
South Carolina [3]	82	30	51	20	522	191	179	94	5	2	6	5
Georgia [3]	56	34	50	26	37	22	----	----	2	1	0	0
Florida [3]	27	9	8	8	21	7	----	----	12	4	33	2
E. SO. CEN.												
Kentucky	16	9	14	14	9	5	13	3	2	1	3	17
Tennessee	28	16	35	25	19	11	22	22	12	7	3	5
Alabama [3]	72	41	35	31	63	36	26	6	4	2	6	6
Mississippi [2] [3]	66	26	25	19	----	----	----	----	----	----	----	0
W. SO. CEN.												
Arkansas	37	15	23	9	7	3	12	3	10	4	4	2
Louisiana [3]	12	5	4	4	15	6	----	3	0	0	3	3
Oklahoma	12	6	14	11	10	5	26	18	8	4	20	2
Texas [3]	20	24	43	38	29	35	94	36	23	28	3	8
MOUNTAIN												
Montana	28	3	0	1	243	26	9	4	9	1	15	3
Idaho	10	1	0	1	----	----	6	----	41	4	6	1
Wyoming	44	2	1	0	----	----	----	----	44	2	4	1
Colorado	14	3	10	5	48	10	----	----	43	9	9	4
New Mexico	74	6	4	2	----	----	----	----	0	0	0	1
Arizona	0	0	1	2	172	14	14	12	37	3	5	3
Utah [2]	0	0	0	0	20	2	1	----	119	12	3	2
PACIFIC												
Washington	3	1	1	1	----	----	----	----	93	30	3	13
Oregon	0	0	1	0	15	3	4	7	20	4	9	4
California	8	10	13	20	9	11	6	12	17	21	74	23
Total	18	455	588	588	24	511	479	346	14	335	495	495
36 weeks	15	13,235	15,998	16,189	201	152,791	47,295	105,025	393	349,706	762,470	670,288

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	1	1	0	0	2	2	6	1	0	3
New Hampshire	0	0	0	0	30	3	0	0	0	0	0	2
Vermont	0	0	0	0	27	2	0	1	0	0	7	3
Massachusetts	1.2	1	2	1	6	5	1	1	21	18	23	32
Rhode Island	0	0	0	0	0	0	0	0	15	2	1	3
Connecticut	0	0	1	0	12	4	3	3	6	2	10	8
MID. ATL.												
New York	1.2	3	2	4	35	88	9	20	14	35	61	88
New Jersey	1.2	1	1	1	51	43	2	5	30	25	17	18
Pennsylvania	1.5	3	0	2	10	20	8	8	22	44	90	76
E. NO. CEN.												
Ohio	2.3	3	0	0	13	17	1	2	75	98	52	35
Indiana	0	0	0	2	4	3	1	3	68	46	35	88
Illinois	0.7	1	4	4	9	13	10	22	47	72	92	92
Michigan [3]	0	0	1	2	70	66	4	14	62	59	83	50
Wisconsin	0	0	0	1	9	5	2	4	107	61	46	46
W. NO. CEN.												
Minnesota	0	0	0	0	89	46	3	4	52	27	29	18
Iowa	0	0	0	0	4	2	3	4	14	7	22	19
Missouri	0	0	0	2	0	0	0	2	12	9	29	32
North Dakota	0	0	0	0	7	1	0	0	66	9	11	5
South Dakota	0	0	0	0	0	0	0	2	23	3	9	9
Nebraska	0	0	1	0	4	1	0	0	38	10	13	9
Kansas	0	0	0	0	0	0	0	1	89	32	31	18
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	0	0	2	1
Maryland [3]	3	1	0	1	6	2	1	1	43	14	14	15
Dist. of Col.	0	0	0	0	24	3	2	0	32	4	1	6
Virginia	1.9	1	2	2	9	5	2	4	36	19	18	18
West Virginia	2.7	1	4	1	2.7	1	0	3	78	29	19	29
North Carolina [3]	1.5	1	2	2	13	9	1	1	50	34	34	34
South Carolina [3]	5	2	0	0	33	12	2	1	44	16	12	5
Georgia [3]	0	0	1	1	0	0	2	0	23	14	13	13
Florida [3]	0	0	2	1	3	1	0	0	15	5	4	4
E. SO. CEN.												
Kentucky	3	2	1	1	5	3	0	4	47	27	44	42
Tennessee	0	0	1	1	5	3	0	3	90	51	28	27
Alabama [3]	1.8	1	1	1	0	0	4	4	60	34	11	13
Mississippi [2, 3]	0	0	1	1	0	0	0	1	28	11	9	9
W. SO. CEN.												
Arkansas	2.5	1	0	1	2.5	1	0	1	25	10	8	8
Louisiana [3]	2.4	1	0	0	2.4	1	0	2	17	7	1	3
Oklahoma	2	1	0	0	4	2	0	0	12	6	13	8
Texas [3]	0	0	2	2	10	12	3	3	20	24	50	24
MOUNTAIN												
Montana	0	0	1	0	0	0	0	1	28	3	4	5
Idaho	0	0	0	0	0	0	0	0	20	2	1	2
Wyoming	0	0	0	0	0	0	0	0	22	1	1	2
Colorado	5	1	5	1	24	5	1	1	39	8	5	8
New Mexico	0	0	0	0	37	3	1	1	86	7	5	5
Arizona	37	3	0	0	61	5	0	1	0	0	5	2
Utah [3]	0	0	0	0	0	0	0	1	60	6	4	4
PACIFIC												
Washington	0	0	0	1	0	0	0	2	40	13	10	10
Oregon	0	0	0	0	20	4	0	0	30	6	4	11
California	0.8	1	0	1	37	45	5	25	42	51	42	64
Total	1.2	29	36	44	17	436	73	294	38	962	1,023	1,023
36 weeks	1.6	1,452	2,250	4,336	4	3,454	1,163	4,982	131	118,940	139,717	167,490

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases	1934–38, median	Sept. 9, 1939, rate	Sept. 9, 1939, cases	Sept. 10, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	3	3	66	11	26
New Hampshire	0	0	0	0	10	1	1	0	0	0	0
Vermont	0	0	0	0	0	0	0	0	268	20	27
Massachusetts	0	0	0	0	4	3	6	5	111	94	65
Rhode Island	0	0	0	0	0	0	0	0	229	30	6
Connecticut	0	0	0	0	3	1	3	2	187	63	52
MID. ATL.											
New York	0	0	0	0	8	19	44	30	126	316	398
New Jersey	0	0	0	0	8	7	6	14	187	157	265
Pennsylvania	0	0	0	0	14	28	18	25	152	299	252
E. NO. CEN.											
Ohio	0	0	1	0	22	29	22	54	128	167	90
Indiana	1	1	3	1	18	12	14	14	86	58	7
Illinois	0	0	0	0	39	59	35	35	149	227	454
Michigan [2]	0	0	1	0	5	5	11	11	138	131	231
Wisconsin	0	0	1	1	7	4	5	5	274	156	383
W. NO. CEN.											
Minnesota	0	0	3	0	0	0	3	3	114	59	43
Iowa	2	1	0	0	12	6	5	5	26	13	16
Missouri	1	1	0	0	6	5	28	28	17	13	24
North Dakota	0	0	0	1	7	1	2	2	110	15	28
South Dakota	15	2	0	0	0	0	0	1	30	4	2
Nebraska	4	1	0	1	0	0	1	1	19	5	11
Kansas	0	0	1	1	20	7	5	11	22	8	49
SO. ATL.											
Delaware	0	0	0	0	79	4	1	1	98	5	9
Maryland [2]	0	0	0	0	19	6	9	11	130	42	17
Dist. of Col.	0	0	0	0	8	1	8	2	89	11	7
Virginia	0	0	0	0	36	19	23	23	73	39	32
West Virginia	0	0	0	0	62	23	31	19	16	6	27
North Carolina [3]	0	0	0	0	13	9	13	15	159	109	147
South Carolina [3]	0	0	0	0	49	18	25	19	98	36	88
Georgia [3]	0	0	0	0	25	15	33	24	53	32	26
Florida [3]	0	0	0	0	3	1	2	2	3	1	14
E. SO. CEN.											
Kentucky	0	0	1	0	47	27	38	52	59	34	74
Tennessee	0	0	0	0	48	27	28	36	49	28	35
Alabama [3]	0	0	1	0	21	12	14	15	25	14	13
Mississippi [2] [3]	0	0	0	0	15	6	7	13			
W. SO. CEN.											
Arkansas	0	0	0	0	62	25	24	16	5	2	16
Louisiana [3]	0	0	0	0	27	11	12	19	12	5	40
Oklahoma	0	0	3	1	60	30	29	23	14	7	23
Texas [3]	0	0	3	0	33	40	47	47	41	49	64
MOUNTAIN											
Montana	0	0	1	2	19	2	2	7	94	10	37
Idaho	0	0	0	0	31	3	3	3	41	4	4
Wyoming	0	0	1	1	0	0	1	1	44	2	5
Colorado	10	2	2	2	63	13	13	6	111	23	31
New Mexico	0	0	0	0	62	5	8	7	74	6	7
Arizona	0	0	0	0	135	11	5	5	61	5	4
Utah [2]	0	0	0	0	0	0	2	1	437	44	19
PACIFIC											
Washington	0	0	10	10	6	2	7	3	56	18	20
Oregon	0	0	5	3	25	5	2	5	104	21	26
California	5	6	4	2	12	15	15	15	58	71	116
Total	1	14	41	39	21	517	614	636	100	2,470	3,339
36 weeks	10	8,721	12,810	6,167	10	8,743	9,883	10,010	151	134,239	155,028

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Sept. 9, 1939, 112 cases as follows: North Carolina, 2; South Carolina, 13; Georgia, 42; Florida, 6; Alabama, 20; Mississippi, 5; Louisiana, 8; Texas, 16.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Sept. 16, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Aug. 13 to Sept. 9	Week ended Sept. 16
Eastern:								
New York				3	8	1	1	1
New Jersey				4	8	7	8	1
Pennsylvania				6	3	4	1	
Delaware				3			1	
Maryland			7	13	11	23	12	
District of Columbia			2	2	2	3	2	
Virginia			1	18	10	11	11	1
West Virginia						1		
North Carolina				3	18	18	6	
Georgia					1	1		
Central:								
Ohio				3	2	4	8	
Indiana				2	1	3	5	1
Illinois			1	1	5	7	1	
Kentucky							6	1
Tennessee					5	5	9	2
Iowa			1	10	9	6	1	
Missouri				1		4	4	
Western:								
Montana	[1] 2	2	8	5	1	2	1	
Idaho		4	7	4	5			
Wyoming		3	14	16	5	5		
Colorado		2	3	9	4			
Arizona							1	
Utah		2	5	5	6	2	1	
Washington		2	3	2				
Oregon		9	16	7	2	1		

[1] 1 other case was reported in Montana as occurring in February, exact date not given.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
May 1939										
Puerto Rico	47	50	1,353	16	0	1	0	0	0	40
August 1939										
Connecticut	1	1	2	71	1		6	21	0	15
Delaware	0			3	0		2	1	0	8
Iowa	14	1	8	80	2	1	6	44	13	38
Missouri	12	1	39	3	0		4	46	1	92
New Mexico	3	2	1	2	2		7	16	2	8
Texas	70	109	613	63	11	89	36	61	0	173
West Virginia	18	26	1	10	3	1	2	65	5	56
Wyoming	4	1		36	1		0	6	2	8

Summary of monthly reports from States—Continued

May 1939

	Cases
Puerto Rico:	
Chickenpox	43
Dysentery	13
Mumps	2
Ophthalmia neonatorum	3
Puerperal septicemia	11
Tetanus	14
Whooping cough	93

August 1939

	Cases
Actinomycosis:	
Connecticut	1
Wyoming	1
Anthrax:	
New Mexico	1
Chickenpox:	
Connecticut	34
Delaware	3
Iowa	13
Missouri	6
New Mexico	3
Texas	40
West Virginia	8
Wyoming	2
Colorado tick fever:	
Wyoming	1
Dengue:	
Texas	7
Diarrhea:	
New Mexico	20
Dysentery:	
Connecticut (bacillary)	12
Delaware (bacillary)	1
Iowa (bacillary)	1
Missouri	13
New Mexico (amoebic)	1
New Mexico (bacillary)	14
New Mexico (unspecified)	13

August 1939

	Cases
Dysentery—Continued.	
Texas (amoebic)	15
Texas (bacillary)	122
West Virginia (bacillary)	4
Encephalitis, epidemic or lethargic:	
Missouri	1
Wyoming	1
German measles:	
Connecticut	7
New Mexico	1
Wyoming	3
Hookworm disease:	
Missouri	8
Leprosy:	
Texas	4
Mumps:	
Connecticut	53
Delaware	4
Iowa	19
Missouri	20
Texas	41
West Virginia	8
Wyoming	23
Ophthalmia neonatorum:	
New Mexico	1
Rabies in animals:	
Iowa	2
Missouri	4
Rocky Mountain spotted fever.	
Iowa	5
Missouri	1
West Virginia	1
Wyoming	2
Septic sore throat:	
Connecticut	9
Iowa	6
Missouri	1

August 1939

	Cases
Septic sore throat—Con.	
New Mexico	2
Wyoming	2
Tetanus:	
Connecticut	2
Trachoma:	
Missouri	12
New Mexico	2
Trichinosis	
Connecticut	3
Tularaemia:	
Iowa	7
Missouri	1
New Mexico	3
Texas	1
West Virginia	1
Wyoming	5
Typhus fever:	
New Mexico	2
Texas	73
West Virginia	1
Undulant fever.	
Connecticut	5
Iowa	19
Missouri	4
New Mexico	1
Texas	41
West Virginia	1
Wyoming	2
Vincent's infection:	
Wyoming	2
Whooping cough:	
Connecticut	274
Delaware	33
Iowa	65
Missouri	88
New Mexico	45
Texas	244
West Virginia	30
Wyoming	10

WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 2, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	96	39	12	157	281	270	3	338	89	1,172	-------
Current week [1]	57	30	5	103	206	201	1	303	56	834	-------
Maine:											
Portland	0	------	0	0	1	0	0	0	2	4	24
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	11
Manchester	0	------	0	0	0	0	0	0	0	0	8
Nashua	0	------	0	0	0	0	0	0	0	0	1
Vermont											
Barre	0	------	0	0	0	0	0	0	0	0	2
Burlington	0	------	0	0	0	0	0	0	0	0	11
Rutland	0	------	0	0	0	0	0	0	0	0	7
Massachusetts:											
Boston	0	------	0	9	0	7	0	10	2	23	163
Fall River	0	------	0	0	1	1	0	0	0	2	27
Springfield	0	------	0	0	1	0	0	2	1	0	36
Worcester	0	------	0	0	1	2	0	0	0	0	-------
Rhode Island:											
Providence	0	1	-------	12	3	0	0	3	0	28	36
Connecticut:											
Bridgeport	0	------	0	0	0	0	0	1	0	0	18
Hartford	0	------	0	0	0	0	0	1	0	17	44
New Haven	0	------	0	2	1	1	0	1	0	7	40

[1] Figures for Springfield, Ill., estimated; report not received.

City reports for week ended Sept. 2, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New York:											
Buffalo	0	------	0	1	4	6	0	5	0	4	100
New York	6	1	0	16	26	17	0	61	6	104	1, 138
Rochester	0	------	0	0	5	0	0	0	0	2	46
Syracuse	0	------	0	0	0	1	0	0	0	21	44
New Jersey:											
Camden	0	------	0	0	0	1	0	0	0	0	22
Newark	0	------	0	1	2	0	0	8	0	21	74
Trenton	0	------	0	1	2	0	0	1	0	2	23
Pennsylvania:											
Philadelphia	0	------	1	5	13	10	0	11	3	97	339
Pittsburgh	0	------	0	1	5	2	0	15	0	29	169
Reading	0	------	0	0	1	0	0	2	0	0	19
Scranton	0	------	------	0	------	0	0	------	0	3	------
Ohio:											
Cincinnati	0	------	------	0	------	4	0	------	1	11	108
Cleveland	0	1	0	1	3	7	0	9	0	51	158
Columbus	0	------	0	1	2	4	0	0	0	5	48
Toledo	0	------	0	0	3	2	0	3	0	13	69
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	3	6
Fort Wayne	0	------	0	0	2	1	0	0	1	0	18
Indianapolis	0	------	0	1	9	9	0	4	3	16	106
Muncie	0	------	0	0	2	0	0	0	0	0	13
South Bend	0	------	0	0	0	0	0	0	0	2	17
Terre Haute	0	------	1	0	1	1	0	0	0	0	15
Illinois:											
Alton	0	------	0	0	1	0	0	0	0	0	7
Chicago	9	2	0	6	14	26	0	40	6	81	606
Elgin	0	------	1	0	0	0	0	0	0	5	10
Moline	0	------	0	0	0	0	0	0	0	0	14
Springfield	------	------	------	------	------	------	------	------	------	------	------
Michigan:											
Detroit	3	------	0	5	5	10	0	9	3	83	196
Flint	1	------	0	0	1	1	0	0	2	5	16
Grand Rapids	0	------	0	0	3	4	0	0	1	4	33
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	2	9
Madison	0	------	0	1	0	1	0	0	0	11	5
Milwaukee	0	------	0	1	0	10	0	3	0	20	95
Racine	0	------	0	0	0	2	0	1	0	6	8
Superior	0	------	0	0	0	1	0	0	0	0	3
Minnesota:											
Duluth	0	------	0	2	0	1	0	0	0	0	19
Minneapolis	0	------	0	2	0	2	0	0	1	2	96
St. Paul	0	------	0	1	7	1	0	1	0	13	63
Iowa:											
Cedar Rapids	0	------	------	1	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	1	0	------	0	0	------
Des Moines	0	------	0	0	0	3	1	0	0	0	31
Sioux City	0	------	------	1	------	0	0	------	0	1	------
Waterloo	1	------	------	0	------	0	0	------	0	2	------
Missouri:											
Kansas City	0	------	0	1	2	2	0	6	1	0	80
St. Joseph	0	------	0	0	0	2	0	1	0	0	23
St. Louis	5	------	0	0	5	2	0	2	0	8	213
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	1	3
Grand Forks	0	------	------	1	------	0	0	------	0	0	------
Minot	0	------	------	1	------	0	0	------	0	0	8
South Dakota:											
Aberdeen	0	------	------	2	------	0	0	------	0	7	------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	10
Nebraska:											
Lincoln	0	------	------	0	------	0	0	------	0	1	------
Omaha	0	------	0	0	0	1	0	0	0	0	44
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	1	2
Topeka	0	------	0	0	1	4	0	0	0	0	14
Wichita	1	------	0	2	1	0	0	1	0	3	32
Delaware:											
Wilmington	0	------	0	0	1	1	0	0	0	1	20
Maryland:											
Baltimore	0	------	0	1	3	2	0	7	1	25	152
Cumberland	0	------	0	0	0	2	0	0	0	0	9
Frederick	0	------	0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	1	1	1	2	3	2	0	5	2	29	119

City reports for week ended Sept. 2, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Virginia:											
Lynchburg	0	------	0	0	0	0	0	0	0	5	9
Norfolk	1	------	0	0	0	1	0	3	0	0	21
Richmond	0	------	0	0	3	0	0	1	0	0	38
Roanoke	0	------	0	0	2	0	0	1	1	0	22
West Virginia:											
Charleston	0	------	0	0	1	1	0	0	2	0	12
Huntington	0	------	------	0	------	0	0	------	2	0	------
Wheeling	0	------	0	0	0	0	0	2	0	2	22
North Carolina:											
Gastonia	3	------	------	0	------	0	0	------	0	0	------
Raleigh	1	------	0	0	0	0	0	0	0	1	9
Wilmington	0	------	0	0	2	1	0	0	0	0	8
Winston-Salem	0	------	0	0	1	1	0	0	0	1	10
South Carolina:											
Charleston	1	------	0	0	1	0	0	2	1	0	23
Florence	0	------	0	0	2	0	0	0	0	0	19
Greenville	0	------	0	0	1	0	0	0	0	0	13
Georgia:											
Atlanta	2	5	1	0	6	3	0	9	0	2	83
Brunswick	0	------	0	0	0	0	0	0	0	0	1
Savannah	0	11	0	0	0	1	0	2	0	2	26
Florida:											
Miami	0	------	0	0	1	0	0	0	0	0	30
Tampa	0	1	0	0	2	0	0	0	0	0	16
Kentucky:											
Ashland	1	------	0	0	0	0	0	0	1	0	7
Covington	1	------	0	0	0	1	0	0	0	0	11
Lexington	0	------	0	0	1	0	0	1	3	0	16
Louisville	1	------	0	0	1	3	0	3	0	18	59
Tennessee:											
Knoxville	1	------	0	0	0	0	0	0	2	0	17
Memphis	0	------	0	2	1	0	0	6	0	15	88
Nashville	0	------	0	0	4	1	0	1	1	10	43
Alabama:											
Birmingham	2	------	0	0	1	4	0	2	0	0	69
Mobile	0	------	0	0	1	0	0	1	0	0	29
Montgomery	0	------	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	1	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	0	0	2	0	0	1	0	0	3
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	4
New Orleans	2	1	0	0	6	0	0	9	2	21	154
Shreveport	0	------	0	0	5	0	0	1	1	0	44
Oklahoma:											
Oklahoma City	1	------	0	0	1	3	0	2	2	0	35
Tulsa	0	------	------	1	------	1	0	------	3	0	------
Texas:											
Dallas	2	------	0	1	1	5	0	2	0	1	65
Fort Worth	0	------	0	0	3	6	0	1	1	4	27
Galveston	0	------	0	0	2	0	0	1	1	0	20
Houston	3	------	0	0	2	0	0	10	3	0	88
San Antonio	0	------	0	0	2	0	0	8	1	0	68
Montana:											
Billings	0	------	0	0	1	0	0	0	0	2	9
Great Falls	0	------	0	4	0	0	0	0	0	0	6
Helena	0	------	0	0	0	1	0	0	0	0	3
Missoula	0	------	0	1	0	0	0	0	0	2	8
Idaho:											
Boise	0	------	0	0	2	0	0	0	0	0	10
Colorado:											
Colorado Springs	0	------	0	0	0	0	0	0	0	1	8
Denver	9	------	1	0	5	1	0	5	0	6	88
Pueblo	0	------	0	0	0	0	1	0	0	1	9
Utah:											
Salt Lake City	0	------	0	3	2	0	0	0	0	15	27
Washington:											
Seattle	1	------	0	3	3	1	0	4	0	1	79
Spokane	0	------	0	1	0	4	0	0	0	0	26
Tacoma	0	------	0	4	1	1	0	0	0	0	31
Oregon:											
Portland	1	------	1	1	1	2	0	1	0	0	64
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	6	5	0	5	9	13	0	17	3	11	202
Sacramento	1	------	0	0	2	0	0	1	3	0	25
San Francisco	1	1	0	5	6	3	0	7	1	8	156

City reports for week ended Sept. 2, 1939—Continued

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	0	1
Rhode Island:			
Providence	0	0	1
New York:			
Buffalo	0	0	47
New York	1	1	20
Rochester	0	0	2
New Jersey:			
Camden	0	0	7
Pennsylvania:			
Philadelphia	0	0	15
Pittsburgh	0	0	2
Scranton	1	0	0
Ohio:			
Cincinnati	0	0	1
Cleveland	0	0	6
Illinois:			
Chicago	0	0	3
Michigan:			
Detroit	0	0	51
Grand Rapids	0	0	2
Wisconsin:			
Kenosha	0	0	1
Milwaukee	0	0	2
Minnesota:			
Minneapolis	0	0	15
St. Paul	0	0	6
Kansas:			
Wichita	0	0	1
District of Columbia:			
Washington	0	0	1
Alabama:			
Birmingham	0	0	1
Arkansas:			
Little Rock	0	0	1
Oklahoma:			
Oklahoma City	0	0	2
Texas:			
Houston	0	0	1
Colorado:			
Pueblo	0	0	4
Oregon:			
Portland	0	0	2
California:			
Los Angeles	0	0	20
Sacramento	0	0	1
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 2, Philadelphia, 2, Milwaukee, 1.
Pellagra.—Cases: Boston, 1, Charleston, S. C., 2, Savannah, 2, Tampa, 1, Birmingham, 1.
Rabies in man.—Deaths: South Bend, Ind., 1.
Typhus fever.—Cases: New York, 1, Charleston, S. C., 3, Atlanta, 7; Savannah, 4; Tampa, 3; Birmingham, 1; Mobile, 4, New Orleans, 1, Fort Worth, 1, San Antonio, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended August 5 and 12, 1939.—During the weeks ended August 5 and 12, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended Aug. 5, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					3					3
Chickenpox				20	117	10	13	16	20	196
Diphtheria	1		3	10		6	5	3		28
Dysentery									17	17
Influenza					5					5
Measles		3	1	108	128	15	5	1	6	267
Mumps				1	20	9			2	32
Pneumonia		1			7				2	10
Poliomyelitis					11	1	1	1		14
Scarlet fever		9	2	24	30	6	16	16	5	108
Trachoma							1		1	2
Tuberculosis	2	13	22	67	60	3	41	5		213
Typhoid and paratyphoid fever		1	2	12	4		4	1	3	27
Whooping cough		12		110	81	11	27	11	33	285

Week ended Aug. 12, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2			1			3
Chickenpox			2	13	41	5	9		18	88
Diphtheria		1	1	31		9				42
Dysentery				3						3
Influenza					5					5
Lethargic encephalitis						1				1
Measles		2	1	199	136	20	3		4	365
Mumps				3	9		1		3	16
Pneumonia		3			6				4	13
Poliomyelitis					13	1		2		16
Scarlet fever		7	2	32	54	7	4	7		113
Tuberculosis	3	17	12	52	18	4	23	3		132
Typhoid and paratyphoid fever		2		11	10		1		2	26
Whooping cough		11	5	72	85	13	22		11	219

CUBA

Habana—Communicable diseases—4 weeks ended August 26, 1939.—During the 4 weeks ended August 26, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	13	1	Poliomyelitis	5	
Malaria	4		Typhoid fever	31	6

Provinces—Notifiable diseases—4 weeks ended July 22, 1939.—During the 4 weeks ended July 22, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		1	2	12	1	5	21
Diphtheria	1	20		3		2	26
Hookworm disease		5				5	10
Leprosy		1		1			2
Malaria	14	10	4	17	12	41	98
Measles		1		4		3	8
Poliomyelitis		8					8
Scarlet fever		4	1				5
Tuberculosis	12	42	43	36	19	35	187
Typhoid fever	36	67	42	47	13	53	258
Whooping cough	1			1			2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of August 25, 1939, pages 1573-1585. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Shanghai.—During the week ended September 2, 1939, 36 cases of cholera were reported in Shanghai, China.

Smallpox

Japan—Nagoya.—During the week ended July 29, 1939, 1 case of smallpox was reported in Nagoya, Japan.

Mexico.—During the period July 1 to August 31, 1939, deaths from smallpox have been reported in Mexico, by States, as follows: Aguascalientes, 5; Chiapas, 1; Chihuahua, 1; Durango, 4; Guanajuato, 270; Guerrero, 3; Hidalgo, 9; Jalisco, 3; Mexico, D. F., 1; Mexico, 41; Michoacan, 79; Morelos, 1; Nuevo Leon, 2; Oaxaca, 1; Puebla, 32; Queretaro, 31; San Luis Potosi, 19; Sinaloa, 1; Tlaxcala, 2; Vera Cruz, 1; Zacatecas, 16.

Venezuela—Caracas.—During the period August 1–15, 1939, 10 cases of smallpox (alastrim), with 2 deaths, were reported in Caracas, Venezuela.

Typhus Fever

Egypt—Suez.—During the week ended September 2, 1939, 1 case of typhus fever was reported in Suez, Egypt.

Mexico.—During the period July 1 to August 31, 1939, deaths from typhus fever were reported in Mexico, by States, as follows: Aguascalientes, 4; Coahuila, 5; Durango, 4; Guanajuato, 12; Hidalgo, 19; Jalisco, 7; Mexico, D. F., 9; Mexico, 17; Michoacan, 5; Nuevo Leon, 1; Oaxaca, 16; Puebla, 24; Queretaro, 1; San Luis Potosi, 2; Sonora, 1; Tlaxcala, 3; Vera Cruz, 3; Yucatan, 1; Zacatecas, 14.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OP POLIOMYELITIS

During the week ended September 23, 484 cases of poliomyelitis were reported in the United States, as compared with 501 cases during the preceding week and a median of 274 cases for the corresponding week of the years 1934–38. The incidence during the current week was approximately 75 percent in excess of the 5-year median.

The States reporting more than 10 cases of poliomyelitis during the current week were as follows: New York 128 (with 22 cases in New York City and 48 in Buffalo), Michigan 53, Pennsylvania 50 (24 cases in Philadelphia), Minnesota 52 (with 26 cases in Minneapolis), California 33, New Jersey 38, Illinois 13, New Mexico 14, and Ohio 12 cases.

In the following article and accompanying table, a summary of poliomyelitis incidence, by geographic regions, is given for the 4 weeks ended September 9.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

August 13–September 9, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended September 9, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—The number of cases of poliomyelitis rose from 783 for the preceding 4-week period to 1,648 for the 4 weeks ended September 9. The current incidence was more than 5 times the number of cases reported for the corresponding period in 1938, and more than 1.3 times the 1934–38 average incidence for this period.

Every section of the country except the New England and East South Central has contributed largely to the recent increase of this

disease. However, with the exception of the Middle Atlantic region, the increases seem to be largely due to a high incidence in one or two States in the region rather than to an increase in the whole area. In the Middle Atlantic region, New York reported 287 cases, Pennsylvania 89 cases, and New Jersey 85 cases. In the East North Central region, Michigan reported 377 cases and Illinois 49 cases; in the West North Central region, Minnesota alone reported an excess of cases (183); in the South Atlantic region, South Carolina reported 49 cases and North Carolina 33 cases; in the West South Central region, Texas reported 41 cases. States in the far Western regions reporting a relatively high incidence were California (Pacific region), 200 cases, and Arizona and Colorado (Mountain region), 17 and 12 cases, respectively. Approximately 85 percent of the total cases were reported from 12 States.

A total of 3,454 cases of poliomyelitis has been reported since January 1, 1939, as compared with 1,164 cases during the same period in 1938, and 5,512 cases in 1937. During 1938 the incidence of poliomyelitis was the lowest on record, but the disease was epidemic in the central and northeastern parts of the country in 1937. For the week ended September 16, 1939, there were approximately 500 cases

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Aug. 13–Sept. 9, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,446	1,909	1,909	1,492	1,561	1,257	1,857	2,819	2,909	99	136	216
New England	17	17	28	3	4	4	280	210	210	1	7	7
Middle Atlantic	84	139	169	17	29	29	374	684	735	30	23	40
East North Central	172	159	201	131	88	161	247	545	683	12	18	37
West North Central	90	103	105	14	107	107	166	189	139	5	11	19
South Atlantic	515	705	484	331	501	367	136	320	240	20	23	41
East South Central	248	336	336	119	154	65	56	117	137	8	21	21
West South Central	196	299	251	219	513	221	118	121	121	9	16	13
Mountain	56	80	48	107	98	45	116	184	154	12	11	8
Pacific	68	71	86	51	67	67	364	449	208	2	6	13
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	1,648	307	1,251	3,148	3,264	3,492	89	147	141	2,141	2,295	2,467
New England	30	18	22	94	161	212	0	0	0	33	42	42
Middle Atlantic	461	79	89	453	514	725	0	0	0	148	272	265
East North Central	484	68	217	1,002	918	1,098	28	28	25	513	315	452
West North Central	209	31	50	343	435	431	27	21	21	144	169	209
South Atlantic	130	41	65	389	329	329	7	1	0	383	537	537
East South Central	25	21	88	329	269	245	1	3	3	311	318	520
West South Central	55	15	15	171	230	187	8	8	5	434	449	449
Mountain	42	9	14	114	120	138	7	24	24	89	107	107
Pacific	212	25	113	253	288	335	11	62	39	86	86	86

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

reported, which is the highest weekly incidence reported since the beginning of the present rise. The highest incidence of this disease normally occurs during the month of September.

Influenza.—The influenza incidence (1,492 cases) was slightly below that for the corresponding period in 1938, but it was about 15 percent above the median level for this period. The South Atlantic, East South Central, and Mountain regions reported excesses over the seasonal expectancy, but in all other regions the incidence compared very favorably with that of recent years.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended September 9, there were 1,446 cases of diphtheria reported, as compared with 1,909, 1,468, and 1,393 for the corresponding period in 1938, 1937, and 1936, respectively. A few more cases than normally occur during this period were reported from the South Atlantic and Mountain regions, but in all other regions the incidence was relatively low.

Measles.—The incidence of measles was also comparatively low. For the current 4-week period there were 1,857 cases reported, about 65 percent of the 1934–38 average incidence for this period. The Pacific region reported a 75-percent increase in the number of cases over the preceding 5-year average incidence. Other groups either closely approximated last year's figures or showed significant decreases in the incidence of the disease.

Meningococcus meningitis.—For the country as a whole the incidence of meningococcus meningitis was the lowest reported during this period in the 11 years for which these data are available. The number of cases reported was 99, as compared with 136, 216, and 220 for the corresponding period in 1938, 1937, and 1936, respectively. The Mountain region alone reported an increase (50 percent) in the number of cases over the average incidence of recent years. For the years 1932–34, and 1936, other years of exceptionally low meningitis incidence, the average number of cases for this period was 138, which indicates further the low incidence of this disease that has prevailed during the current year.

Scarlet fever.—For scarlet fever, also, the comparison with recent years was favorable. The number of cases reported (3,148) was slightly lower than the number reported for the corresponding period in 1938 and approximately 90 percent of the 1934–38 average incidence for the period. In the South Atlantic and East South Central regions the number of cases was somewhat above the seasonal expectancy, but in all other regions the incidence was relatively low.

Smallpox.—The number of cases (89) of smallpox reported for the current period was the lowest recorded for this period since the years 1934 and 1933, when there were 70 and 83 cases, respectively, reported

for the corresponding period. From 1934 to 1938, inclusive, there was a steady increase in the incidence of smallpox in the United States, the high incidence, however, being confined largely to the Western and Central regions. During the latter part of 1938 a decline in the number of cases became apparent and in the last few months of the current year the incidence has dropped considerably below the average seasonal expectancy.

Typhoid fever.—Reports indicate that typhoid fever is maintaining a relatively low level. For the current period there were 2,141 cases reported, about 85 percent of the 1934–38 average number of cases for the corresponding period. Of the 513 cases reported from the East North Central region, 259 occurred in Illinios during the week ended September 2. In the Pacific region the number of cases was about normal, but all other regions reported decreases from last year's figures, as well as very significant decreases in some regions from the 1934–38 average figure for this period.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended September 9, based on data received from the Bureau of the Census, was 9.5 per 1,000 inhabitants (annual basis). The average rate for the corresponding period in the 5 preceding years was 9.8.

THE TREATMENT OF LYMPHOPATHIA VENEREUM WITH SODIUM SULFANILYL SULFANILATE [1] AND SODIUM SULFANILATE *

By ARTHUR HEBB, *Proctologist-in-chief, St. Joseph's Hospital,* and *Instructor in Surgery, Johns Hopkins Hospital;* S. G. SULLIVAN, *Resident, St. Joseph's Hospital;* and LLOYD D. FELTON, *Senior Surgeon, United States Public Health Service*

The history of lymphopathia venereum with all its varied manifestations is being clarified rapidly since the discovery by Hellerström (*1*) that the etiologic agent is a filterable virus, and also, prior to this, the introduction by Frei (*2*) of a specific skin test antigen of great diagnostic significance. The disease has become recognized in recent years as a distinct entity, consisting of three progressive stages: Primary, or local infection; secondary, spreading of this infection to the inguinal glands, buboes; and tertiary, or chronic state, in which esthiomene, lympheroids, fistulae and rectal strictures are character-

[1] Prior to June 15, 1938, the sodium sulfanilyl sulfanilate was generously contributed by Mr. S. D. Beard of the Lederle Laboratories, Pearl River, N. Y.

* From St. Joseph's Hospital, the Rectal Clinic of Johns Hopkins Hospital, the Department of Pathology and Bacteriology, Johns Hopkins University, Baltimore, and the Division of Infectious Diseases, National Institute of Health.

istic. In this preliminary report no attempt will be made to include an extensive review of the literature, but rather reference is made to the excellent one given by Frei in 1938 (*3*). Suffice it to say that the first two stages respond to different kinds of treatment, surgical or medical, or both. Such medical treatment is exemplified in the recent work of Hamilton (*4*), and of Trautman and Thomason (*5*), in which it is reported that sulfanilamide has proved of distinct value before stricture development, and that the results have been equal to those obtained with surgical methods, including excision of the gland and cauterization. Also, Trautman and Thomason, in making a comparison of fever therapy and this drug in the early stages of the disease, state that the latter is preferred because of low cost of administration. In their series of 15 consecutive cases treated by fever therapy or sulfanilamide, surgical incision was unnecessary.

In this report, however, our interest is limited to the tertiary stage. During the last 30 years, prior to establishment of the clinical entity of the disease, one of us (Hebb) had been treating this stage of the disease with many different therapeutic measures, including cauterization and other surgical procedures. As a last resort, palliative colostomy was performed, truly a temporary measure, but the only treatment which afforded relief to the patient. Dilatation or incision of the stricture did not result in permanent cure. In recent years, a study was made of the influence of various medical agents, including intravenous tartar emetic, Frei antigen (*2*) injected intravenously, and sulfanilamide. However, none of these proved effectual in the tertiary stage. The results with sulfanilamide were a confirmation of the work of Shropshear (*6*) who reported improvement, with administration of this drug over a prolonged period (as long as 52 days), in the patient's general health as well as in the inflammatory process about the rectum, but with persistence of the stricture. Torpin and collaborators (*7*) reported that sulfanilamide as adjunct therapy has proved valuable but does not appear to affect the strictural lesions per se.

While we were investigating the possibility of a chemotherapeutic agent which might be active against this disease, Dochez and Slanetz (*8*) reported the antiviral activity of sodium sulfanilyl sulfanilate in dog distemper. Their results have not been fully confirmed (*9, 10, 11*), but this drug undoubtedly had antiviral activity against the strain of virus which they used. It was this original observation of Dochez that led us to try sodium sulfanilyl sulfanilate in the tertiary stage of lymphopathia venereum. Preliminary experiments carried on in white mice infected with this virus indicated prolongation of survival time of treated animals as compared with that of control animals. For this reason it was thought worth while to investigate its effect on the tertiary stage of this disease in man for which no

effective treatment is known. This inadequacy of treatment has been emphasized in a recent article by Shaffer and Arnold (*12*) in which it is stated that "our experiences with the commonly accepted methods of treatment of this disease have been entirely unsatisfactory."

In addition to this compound, a simpler one was also studied, the sodium salt of the well-known sulfanilic acid. Both of these compounds have been found to have slight activity in white mice against pneumococcus, meningococcus, and hemolytic streptococcus, but appreciably less than that exhibited by sulfanilamide. The structural formulas are as follows: Sodium sulfanilyl sulfanilate, $NH_2\langle\ \rangle SO_2$-$NH\langle\ \rangle SO_3Na$; sodium sulfanilate, $NH_2\langle\ \rangle SO_3Na$.

Toxicity tests of single injections of these compounds, made in groups of 3 mice, showed that sodium sulfanilyl sulfanilate was significantly more toxic than sodium sulfanilate. This was found true regardless of the route of injections, whether intraperitoneal, subcutaneous, or intravenous. When freshly prepared 10 percent solutions were used, the mice injected with sodium sulfanilyl sulfanilate tolerated 25 mg. intravenously, 25 mg. intraperitoneally, and 75 mg. subcutaneously, and the mice receiving sodium sulfanilate tolerated 100 mg., 150 mg., and 250 mg., respectively. These results represent the highest single doses tolerated by 3 out of 3 mice injected. It has been noted that, after storage for a period of 9 months, sodium sulfanilyl sulfanilate exhibited a definite decrease in toxicity. In one sample, stored in the icebox from September 12, 1938, to June 7, 1939, the highest dose tolerated by all three routes of injection was practically double that of the freshly dissolved material. The toxicity of sodium sulfanilate apparently remains constant on storage.

Since it was observed in preliminary experiments that repeated injections caused a reduction of the hemoglobin content, it was thought that this activity might serve as indicator to establish a dose which would be safe in prolonged medication. Hence, repeated daily injections of 7.5 mg. were made in groups of 10 mice over a period of 2½ months. The blood of each mouse was tested every other day for hemoglobin content. The mean content for the mice given sodium sulfanilyl sulfanilate was 105 percent before injection and 55 percent at the end of the series; for the mice given sodium sulfanilate it was 113 percent and 78 percent, respectively. Unquestionably both compounds in 7.5-mg. doses caused a significant decrease in percent of hemoglobin. The dose of 7.5 mg. is equivalent to 375 mg. per kg., and, consequently, for a 60-kg. individual this dose would be 22.5 grams. Hence, continued daily injections of this dose might produce a similar effect in human beings. On the other hand, 100 mg. of each compound were injected intravenously into 2-kg. rabbits over a

period of 21 days with no significant decrease in hemoglobin content. This dose is equivalent to 3 grams for a 60-kg. individual.

For human beings, intravenous injection was chosen both because of the high solubility of the compounds and because it was thought that, in treatment of the human disease, better tissue penetration would be obtained through this route. The solution for intravenous injection was made up in the following manner. On the basis of a liter lot, 150 grams of dry sodium sulfanilyl sulfanilate powder were placed in a graduated flask with 700 to 800 cc. of water, and sufficient normal NaOH added to bring the pH not higher than 5.5 (11.7 cc. per liter was the average amount required). The volume was then made up to one liter and any insoluble material removed by filtration through hard paper. For sterilization a final filtration was made through a Seitz pad. After ampouling and testing for sterility, the solution was ready for use. Evidently there was some oxidation, for the final material was not quite colorless. Solutions not kept in an icebox became brown, the color of very strong tea. It has been found inadvisable to use such preparations because of reactions obtained following their injection. In some instances the patient would experience a severe chill, pain in the epigastrium, abdominal cramps, and a feeling of suffocation. At no time, however, has any alarming reaction occurred even with 30 cc. doses (4.5 grams). The sodium sulfanilate [2] solution was prepared in the same manner, but in 10 percent concentration. When kept in the icebox these solutions were suitable for human use for a period of at least 3 months.

The dose for human beings was determined by gradually increasing the dose, by 5-cc. amounts, to the maximum that a patient would well tolerate. From preliminary trial it was found possible to inject intravenously a 15-percent solution of sodium sulfanilyl sulfanilate without producing any local reaction in case any of the solution escaped into the surrounding tissue. A concentration of 20 or 25 percent was definitely too high. Ten percent solutions of sodium sulfanilate, practically saturated, were used throughout. Blood concentration varied with each individual, and thus far no optimum blood level has been determined. The rate of excretion was rapid and seemed to vary with the individual. No demonstrable amount was present after 24 hours. In most cases a daily intravenous injection of 20 cc. was used for either drug, representing 3 grams of sodium sulfanilyl sulfanilate and 2 grams of sodium sulfanilate, respectively.

To determine the type of reaction and the effect on blood cells, two individuals were used for controls. One was a normal individual, the other a patient with cancer of the rectum. The former, Mrs. D., who was convalescing from fracture of the hip, received a

[2] A. c. p. grade of commercial sodium sulfanilate was used throughout.

total of 75 grams of sodium sulfanilyl sulfanilate in daily intravenous injections of 10- and 20-cc. doses of a 15-percent solution. The blood picture before and after injections was as follows: Before, hemoglobin 83 percent, red cells 3,980,000, white cells 11,000, polymorphonuclears 68 percent, and lymphocytes 32 percent; after, hemoglobin 86 percent, red cells 4,870,000, white cells 11,100, polymorphonuclears 65 percent, lymphocytes 33 percent, and eosinophiles 2 percent. The other control, J. F., a white male, aged 47, received 186.75 grams of this drug and later 257 grams of sodium sulfanilate in 20-cc. doses daily. Prior to the injections, the blood picture showed hemoglobin 57 percent, red cells 2,600,000, white cells 6,100; and after the injections, hemoglobin 82 percent, red cells 4,370,000, and white cells 10,500. In both of these cases urine examination from time to time showed normal characteristics. From these observations it would appear that neither drug caused destruction of red or white cells with daily injections of 3 grams. On the contrary, in the cancer case, there was an increase in hemoglobin percent. At no time did either individual suffer any untoward reaction from the drug.

CASE REPORTS

In the present series there were 14 patients with lymphopathia venereum (13 in the tertiary stage), 8 of whom were treated with sodium sulfanilyl sulfanilate, 2 with this compound followed by sodium sulfanilate, and 4 with sodium sulfanilate alone. In addition, treatment was given to 4 cases of chronic ulcerative colitis. These patients were so treated because of the possibility of this disease being caused by a virus, and also because of the fact that all 4 failed to respond to usual medication. The following are abstracts of the case histories, including only salient facts which have bearing on this study.

CASES TREATED WITH SODIUM SULFANILYL SULFANILATE

Case 1.—L. S., colored female, aged 41, was in the hospital from May 2, 1938, to June 10, 1938. Onset of illness came in December 1937 with a large lump in the right inguinal region extending down the thigh. On examination Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 48 percent, red cells 3,270,000, white cells 8,000, polymorphonuclears 79 percent, lymphocytes 18 percent, and basophiles 3 percent. On May 7, 1938, diagnosis was made of abscess of right thigh with acute inguinal adenitis due to lymphopathia venereum. This was aspirated subcutaneously, yielding 600 cc. thin, greenish-yellow pus; culture was negative; no tubercle bacilli were found. On May 11 treatment was begun with sodium sulfanilyl sulfanilate and continued to June 10, 32 days, a total

of 49.5 grams being given. The gland receded to a small nodule with no discharge. The patient was apparently cured.

Case 2.—C. K., colored male, aged 30, was admitted to the hospital on April 28, 1938, remaining until December 9, 1938. In 1934, he had had an operation for fistula in ano; in 1937 swelling developed about the anus with purulent bloody discharge. On March 20, 1938, colostomy was performed at another hospital. Examination showed continued discharge, and rectal stricture with orifice smaller than examining finger. Frei test was positive and Wassermann negative. Blood picture showed hemoglobin 55 percent, red cells 3,530,000, white cells 11,000, polymorphonuclears 70 percent, and lymphocytes 30 percent; blood protein was total 11.4 percent, albumin 2.17 percent, and globulin 9.24 percent. Diagnosis was lymphopathia venereum and rectal stricture. Treatment with sodium sulfanilyl sulfanilate was begun on April 29, 1938, and continued until December 8, 1938, a total of 386.55 grams being administered in the 224 days. On July 7, 1938, colostomy was closed, but broke down. On August 3 lympheroidectomy and excision of fistula were performed. On September 22 colostomy was closed, but again broke down; November 11 it was closed and healed. On September 12 stricture was absent, but on October 23 again faint, and treatment was resumed; by December 8 stricture had disappeared and colostomy remained closed. Treatment was discontinued. Blood picture then showed hemoglobin 70 percent, red cells 3,760,000, white cells 8,800, polymorphonuclears 80 percent, and lymphocytes 20 percent. The only reaction to the drug was soreness around anus and sore mouth (small ulcerations and slight bleeding). When the drug was discontinued the mouth healed readily. The patient was apparently cured; stricture was absent.

Case 3.—O. D., colored female, aged 22, was in the hospital from February 10, 1937, to March 25, 1937, and from October 29, 1937, to August 5, 1938. Four months prior to first admission hemorrhoidectomy was performed; stricture was found, with pain in rectum; blood and mucus were present in stool, and tenesmus became more acute. Patient had lost 15 pounds in a year. On admission, February 10, 1937, Frei test was positive and Wassermann positive. Blood picture showed hemoglobin 55 percent, red cells 2,950,000, white cells 7,200, polymorphonuclears 51 percent, lymphocytes 47 percent, eosinophiles 1 percent, basophiles 1 percent; total protein 16.1 percent, albumin 3.1 percent, and globulin 13.0 percent. Diagnosis was lymphopathia venereum, rectal stricture, syphilis. Sigmoidostomy was performed on February 12, 1937, and resection of rectum on November 16, 1937; the area did not heal and profuse purulent discharge continued. Treatment with Frei antigen, a total of 30.6 cc. in 10 weeks, showed no effect; after treatment with 1,145 grains of sulfanilamide discharge was still profuse every 4 or 5 days. Treat-

ment with sodium sulfanilyl sulfanilate was begun on June 21, 1938, and in 42 days 123 grams had been injected. The discharge changed from yellow purulent to thin yellow clear material. When treatment was stopped, drainage ceased. When the patient was discharged from the hospital on August 5, 1938, there was a raw area 0.5 cm. in diameter. At this time blood picture showed hemoglobin 81 percent, red cells 4,270,000, white cells 4,900, polymorphonuclears 64 percent, lymphocytes 36 percent; protein 8.86 percent, with albumin 4.25 percent and globulin 4.61. Frei test was positive, with erythema 2 cm. and edema 0.5 cm. in diameter. On September 13, 1938, the patient returned for observation. She had gained 35 pounds in weight. A small raw area remained with slight discharge daily. On January 9, 1939, there was still a small moist area and slight discharge. Patient was apparently cured, with no stricture.

Case 4—R. C., colored female, aged 32, was in the hospital from November 8, 1937, to April 2, 1938, from June 7, 1938, to July 14, 1938, and from November 28, 1938, to December 22, 1938. Onset occurred 8 years before, with abscess of rectum with suppurative inguinal lymphadenitis. Perirectal abscesses were incised three times, the last 3 years ago. At this time there was hemorrhage from rectum. Fistula was discovered 6 months prior to examination. Physical examination showed fistula and rectal stricture with bloody discharge. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 62 percent, red cells 4,050,000, white cells 9,550, polymorphonuclears 64 percent, lymphocytes 32 percent; protein 13.4 percent, with albumin 3.3 percent and globulin 10.1 percent. Diagnosis was lymphopathia venereum with rectal stricture and fistula in ano. Patient was treated with Frei antigen for 3 weeks, a total of 35.5 cc. The discharge decreased somewhat, but stricture was unchanged. Sulfanilamide was administered for 6 days, a total of 360 grains. After this treatment, the fistula closed but reopened later. Discharge from rectum was not stopped and there was no change in stricture. On May 19, 1938, treatment was begun with sodium sulfanilyl sulfanilate and continued until December 2, 1938, 198 days, a total of 364.5 grams being administered. On December 3 the fistula recurred and was incised. When the stricture disappeared, treatment was discontinued. The blood picture at this time was hemoglobin 73 percent, red cells 3,910,000, white cells 7,250, polymorphonuclears 66 percent, lymphocytes 34 percent, total protein 10.16 percent, with 2.57 percent albumin and 7.59 percent globulin. Reactions to drug consisted of headaches at beginning of treatment, chill lasting 10 minutes on June 8, 1938, but treatment was continued the following day with no untoward reaction; one attack of abdominal pain on July 30, 1938, lasted about 5 minutes. The patient was apparently cured; no stricture was demonstrable.

Case 5.—M. C., colored female, aged 35, was in the hospital from September 10, 1937, to September 28, 1937, and from October 30, 1937 to October 17, 1938. On first admission diagnosis was hemorrhoids and rectal stricture. Hemorrhoidectomy was performed on September 11, 1937. On second admission, the condition was much worse, with purulent discharge from rectum. Rectal examination showed sloughing of perianal tissue; within the rectum there was a large amount of lymphoid tissue with firm stricture. Bloody purulent discharge was profuse. Frei test was positive, Wassermann negative. Diagnosis was lymphopathia venereum, rectal stricture. On November 1, 1937, blood picture showed hemoglobin 45 percent, red cells 3,340,000, white cells 14,700, polymorphonuclears 67 percent, lymphocytes 31 percent, basophiles 1 percent, eosinophiles 1 percent; and on June 23, 1938, protein 15.4 percent, with albumin 3.2 percent and globulin 12.2 percent. On January 6, 1938, ileostomy was performed and was followed by immediate improvement. From February 9 to March 27, 1938, the patient gained in weight from 62 to 73 pounds. Patient was treated with Frei antigen until May 6, 1938, but with no further improvement. On May 12, 1938, treatment with sodium sulfanilyl sulfanilate was begun and continued until July 27, 1938, for 77 days, a total of 174.25 grams being given. The discharge ceased after administration of 14.25 grams. During the first 2 weeks of this period, frequent headaches occurred; no other reactions were noted. After the twenty-fifth dose, the nodules and stricture disappeared. Treatment was continued for 40 more doses. Ileostomy was closed on July 6, 1938, and again on September 22, 1938. When discharged from the hospital on October 17, 1938, the patient weighed 82 pounds. Blood picture showed hemoglobin 78 percent, red cells 4,320,000, white cells 7,200, polymorphonuclears 52 percent, and lymphocytes 48 percent; and protein 7.35 percent, with albumin 2.89 percent and globulin 4.04 percent. When examined on May 11, 1939, patient weighed 110 pounds; there was an external scar at site of old slough and no internal stricture. The patient was apparently cured.

Case 6.—G. J., colored female, aged 33, was in the hospital from February 23 to March 26, 1938, and from July 14 to August 1, 1938. Four months prior to admission, there was severe pain and tenderness in the lower abdomen, and profuse rectal discharge. Examination revealed rectal stricture 1½ inches inside anus, admitting only tip of finger, and external hemorrhoids. The Frei test was positive, and Wassermann negative. The blood picture showed hemoglobin 62 percent, red cells 4,020,000, white cells 4,400, polymorphonuclears 80 percent, lymphocytes 20 percent; total protein 8.89 percent, albumin 3.98 percent and globulin 4.91 percent. Diagnosis was lymphopathia venereum with rectal stricture and hemorrhoids. Although

treated with Frei antigen for more than 9 weeks, and although stricture was manually dilated 10 times, the condition remained unchanged. On May 19, 1938, treatment with sodium sulfanilyl sulfanilate was begun and continued until December 19, 1938, for 246 days, a total of 278.75 grams being given. The only untoward reaction, on November 9, 1938, was a slight dizziness and feeling of faintness. After December 19, the patient did not return for treatment because she was unable to leave her position. Blood picture then showed hemoglobin 70 percent, red cells 3,790,000, white cells 9,950, polymorphonuclears 68 percent, lymphocytes 32 percent. In this patient the stricture was decreased, and there was 75 percent improvement.

Case 7.—M. P., colored female, aged 29, was in the hospital from August 1 to September 30, 1938. Duration of illness had been 6 years, with abdominal pain and purulent yellow-brown, sometimes bloody, rectal discharge. Three weeks before admission the patient had chills and fever lasting a week. Examination revealed stricture, which X-ray showed to be extended from 1 inch from the anus 16 inches from the rectum into the sigmoid colon. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 71 percent, red cells 3,610,000, white cells 9,950, polymorphonuclears 52 percent, lymphocytes 46 percent, eosinophiles 2 percent; protein 8.91 percent, albumin 2.65 percent, and globulin 6.26 percent. Diagnosis was lymphopathia venereum with rectal stricture. Treatment with sodium sulfanilyl sulfanilate was begun on August 3, 1938, and continued to January 19, 1939, for 170 days, a total of 372 grams being given. After administration of 207 grams a papulovesicular rash, resembling ivy poisoning, developed over the entire body and lasted for 2 weeks. Treatment was then resumed with small doses, increasing to 10 cc., without untoward reaction. On September 11, 1938, examination from barium enema showed that stricture was decreased but not cured. Patient vomited twice following 20 cc. doses. On January 10, 1939, stricture was dilated. Blood picture on December 21, 1938, showed hemoglobin 89 percent, red cells 4,300,000, white cells 6,450, polymorphonuclears 68 percent, and lymphocytes 32 percent. There was 50 percent improvement in this case.

Case 8.—B. T., colored female, aged 32, was in hospital from March 25 to April 17, 1938, and from July 7 to August 5, 1938. Three years before admission to this hospital the case was diagnosed as hemorrhoids, with rectal stricture; stricture was dilated several times. Profuse discharge continued. On March 25, 1938, examination showed external lympheroids and rectal stricture which would not admit examining finger. From barium enema, definite irregularity was observed in stricture of lower 4 inches of rectum. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 65 percent, red cells 3,730,000, white cells 4,850, polymor-

phonuclears 54 percent, lymphocytes 41 percent, eosinophiles 2 percent, monocytes 3 percent; protein 8.92 percent with albumin 3.92 percent and globulin 5.0 percent. Diagnosis was lymphopathia venereum with rectal stricture and lympheroids. For 3 weeks Frei antigen was used with no apparent benefit. On May 19, 1938, treatment was begun with sodium sulfanilyl sulfanilate, and continued to November 23, 1938, 189 days, a total of 385.5 grams being given. On September 16 stricture was dilated. On December 7 lympheroids were quite edematous. On December 23 stricture admitted finger; some discharge continued. On November 18 blood picture showed hemoglobin 71 percent, red cells 3,750,000, white cells 8,050, polymorphonuclears 70 percent, lymphocytes 30 percent. There was 50 percent improvement in this patient.

SUCCESSIVE TREATMENTS WITH SODIUM SULFANILYL SULFANILATE AND SODIUM SULFANILATE

Case 9.—W. B., colored male, aged 26, was in hospital from February 23 to March 26, 1938, and from June 16 to July 6, 1938. Onset of illness occurred a year previously with boil on right side of anus. Soon after, there was purulent discharge from anus. Rectal examination showed external lympheroids, fistulous openings on each side of anus, and profuse discharge; there was no stricture, but anal canal was filled with large firm nodules. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 84 percent, red cells 4,590,000, white cells 8,000, polymorphonuclears 54 percent, lymphocytes 44 percent, eosinophiles 2 percent; blood protein 13.5 percent, albumin 4.8 percent, and globulin 9.7 percent. Diagnosis was lymphopathia venereum with fistula in ano. On February 24, 1939, fistula was excised; treatment with Frei antigen from March 3 to May 17, 1938, produced no change in condition. On May 19, 1938, treatment with sodium sulfanilyl sulfanilate was begun and continued until September 19, 1938, 123 days, a total of 158 grams being administered. Reaction to drug was severe pain, with cramps, and headache on July 20 and 21 and September 19. For this reason treatment was changed to sodium sulfanilate from September 26 to December 13, 99 days, a total of 111 grams being given. No reaction followed injection of this latter drug. Discharge decreased and lesions disappeared. Treatment was discontinued. Blood picture showed hemoglobin 93 percent, red cells 4,660,000, white cells 6,300, polymorphonuclears 66 percent, lymphocytes 34 percent, protein 7.35 percent, albumin 3.91 percent, and globulin 3.44 percent. This patient was apparently cured.

Case 10.—I. R., colored female, aged 40, was in the hospital from June 23 to September 19, 1938. Rectal stricture was discovered in 1923. Bleeding and purulent rectal discharge had been checked

with two courses of fifty 5-grain tablets of sulfanilamide, but stricture remained. Patient was also treated with tartar emetic and mercurochrome. Hysterectomy was performed on February 3, 1938. On examination, nodule in anal canal was found and stricture which would not admit finger. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 70 percent, red cells 3,930,000 white cells 5,550, polymorphonuclears 58 percent, lymphocytes 40 percent, eosinophiles 2 percent; protein 8.57 percent, with albumin 4.19 percent and globulin 4.38 percent. Diagnosis was lymphopathia venereum with rectal stricture. Treatment with sodium sulfanilyl sulfanilate was begun on June 24 and continued to August 8, 1938, 46 days, a total of 243 grams being given. A chill followed injection on July 29. On August 9 blood picture showed hemoglobin 80 percent, red cells 4,600,000, white cells, 3,650, polymorphonuclears 56 percent. Treatment was changed to sodium sulfanilate from August 8 to September 19, 43 days, a total of 84 grams being given. On February 24, 1939, stricture still remained, but orifice was larger. Another series of treatments was instituted.

CASES TREATED WITH SODIUM SULFANILATE

Case 11.—M. B., colored female, aged 39, was in the hospital from October 7, 1938, to March 5, 1939. Illness began 3 years ago with perianal swelling and difficulty in bowel movement and purulent discharge. Examination showed multiple (14) anal fistulae, purulent discharge, and stricture of rectum which admitted only tip of examining finger. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 38 percent, red cells 2,370,000, white cells 5,250, polymorphonuclears 55 percent, lymphocytes 28 percent, monocytes 3 percent, eosinophiles 13 percent, basophiles 1 percent; total protein 8.29 percent, albumin 3.15 percent, and globulin 5.14 percent. Diagnosis was lymphopathia venereum with rectal stricture and multiple fistulae. From October 11, 1938, to February 4, 1939, 86 days, a total of 270 grams of sodium sulfanilate was injected intravenously. On December 3 fistulae were opened radically with the electric knife. The patient began to improve from this time on; daily intermittent fever, with rise of temperature to 104° F., gradually dropped to normal. Examination on February 4 showed that stricture had disappeared, but slight drainage of unhealed fistula persisted. On March 5 patient was discharged, apparently cured, with great improvement in general health. On March 24 examination showed that stricture was absent, incisions of fistulae were practically healed, and there was no purulent discharge. On May 30, 1939, incisions were healed, and there was no stricture or discharge present.

Case 12.—L. J., colored female, aged 25, was in the hospital from

November 30 to December 17, 1938. For 3 years there had been bleeding of rectum, and for 2 years difficulty in bowel movement. For a year a purulent discharge from the anus was becoming more profuse. Examination revealed a rectal fistula to right of anus, with stricture which admitted the examining finger, and a moderate amount of discharge. Frei and Wassermann tests were positive. The blood picture showed hemoglobin 78 percent, red cells 4,240,000, white cells 5,650, polymorphonuclears 64 percent, lymphocytes 27 percent, monocytes 2 percent, eosinophiles 5 percent, and basophiles 2 percent; total protein 7.65 percent, with albumin 3.13 percent and globulin 4.52 percent. The diagnosis was lymphopathia venereum, fistula, and rectal stricture. On December 1, 1938, fistula was excised and healed readily. On December 12 treatment was begun with sodium sulfanilate and continued to March 23, 1939, 100 days, a total of 110 grams being given. At the end of this series, stricture and rectal discharge had disappeared. Blood picture on April 5, 1939, showed hemoglobin 76 percent, red cells 4,070,000, white cells 3,650, polymorphonuclears 58 percent; and lymphocytes 42 percent; protein 7.64 percent, with albumin 4.28 percent and globulin 3.36 percent. Drug was tolerated well without untoward manifestations. The patient was apparently cured.

Case 13.—B. S., colored female, aged 32 years, was in the hospital from January 13 to 28, 1939. Onset of illness a year previously was characterized by mucus and blood in stool. A stricture was discovered and dilatations begun. At this time, yellow purulent mucoid discharge developed. With sulfanilamide treatment, discharge ceased very promptly. Examination showed stricture inside anus, large enough to admit index finger, also slightly nodular piling up of inflammatory tissue. Frei test was positive, and Wassermann negative. Blood picture showed hemoglobin 55 percent, red cells 3,360,000, white cells 10,050, polymorphonuclears 64 percent, lymphocytes 32 percent, monocytes, 4 percent; total protein 11.4 percent, albumin 1.16 percent and globulin 10.24 percent. Diagnosis was lymphopathia venereum with rectal stricture. From January 19 to March 11, 1939, 52 days, sodium sulfanilate was injected, a total of 125.5 grams, with no untoward reactions. Patient is still being treated, but to date improvement is considered 50 percent both in regard to drainage of the stricture and general health of the patient.

Case 14.—L. S., colored female, aged 28, was in the hospital from September 9, 1938, to November 15, 1938. Patient had been in hospital in 1935 with hemorrhoids and rectal stricture. Colostomy was performed on February 6, 1935; typhoid vaccine was administered on July 10, 15, and 18, 1935. She was discharged from hospital on July 31, 1935, only slightly improved. On August 20, 1938, she developed pneumonia. Colostomy closed and discharge increased.

Examination on September 9 showed colostomy almost closed with small hernia, rectal stricture, and moderate amount of discharge. Frei test was positive, Wassermann negative. Blood picture showed hemoglobin 60 percent, red cells 3,720,000, white cells 8,700, polymorphonuclears 82 percent, lymphocytes 18 percent; total protein 8.6 percent, albumin 2.94 percent, and globulin 5.66 percent. Diagnosis was lymphopathia venereum with rectal stricture. Treatment with sodium sulfanilate was begun on September 12, 1938, and continued until March 11, 1939, 181 days, a total of 249 grams being given. Patient had intermittent fever until October 1, 1938. She had severe pains until manual dilatation was performed on September 8, 1938. On October 5 discharge was less; on November 15 stricture was opening. On January 5 there was marked improvement; finger could be passed through stricture with ease and caused no pain. Blood picture on January 5 showed hemoglobin 70 percent, red cells 4,150,000, white cells 3,350, polymorphonuclears 58 percent, and lymphocytes 42 percent. Treatment was continued with doses as large as 30 cc.; by March 11 a total of 249 grams had been injected and Frei test was still positive. However, stricture was much smaller. Treatment is being continued, and there has been about 75 percent improvement.

TABLE 1.—*Summary of treatment of 8 cases of lymphopathia venereum with sodium sulfanilyl sulfanilate*

Patient	Serum albumin (percent)	Serum globulin (percent)	Duration of treatment (weeks)	Total amount of drug injected (grams)	Hemoglobin (percent) (Sahli stand.)		Leucocyte count		Results
					Before drug	After drug	Before drug	After drug	
L. S.	-------	-------	4.5	49.5	48	-------	8,000	----	Adenitis cured.
C. K	2.17	9.24	32	386.55	55	70	11,000	8,800	Stricture absorbed.
O. D.	3 1	13 0	6	123	55	81	7,200	4,900	Do.
R. C.	3.3	10.1	28	364.5	62	73	9,550	7,250	Do.
M. C.	3 2	12.2	11	174.25	45	78	14,700	7,200	Do.
G J.	3.98	4.91	35	278.75	62	70	4,400	9,950	Stricture reduced 75 percent.
M. P.	2 65	6.26	24	372	71	89	9,950	6,450	Stricture reduced 50 percent.
B. T.	3 92	5.0	27	385.5	65	71	4,850	8,050	Do.

A summary of the results of the treatment of 8 cases of lymphopathia venereum with sodium sulfanilyl sulfanilate is given in table 1. All were in the tertiary stage except one, L. S. It is noted that the serum albumin-globulin ratio is the reverse of that of normal individuals, an observation which confirms the recent work of Rosen et al. (*13*), who have found this condition in 100 percent of stricture cases. In addition, all these patients gave positive Frei tests; consequently the diagnosis of lymphopathia venereum was assured. The average duration of treatment was long, varying from 6 to 35 weeks. Despite this prolonged medication, blood picture was, if anything, improved,

particularly in hemoglobin content. The white cell count varied somewhat, but there was no indication of bone marrow destruction even in the case, G. J., treated for 35 weeks.

Successive treatment of 2 cases, first with sodium sulfanilyl sulfanilate and then with sodium sulfanilate because of lack of tolerance of the former drug, is shown in table 2. The only difference between these cases and those previously described is, perhaps, the alteration in the blood picture of the one case, I. R. The white cells were reduced from 5,500 to a low count of 3,650, 56 percent of which were polymorphonuclears. Although there is no indication of abnormal cells at present, the patient will be followed very closely as treatment continues. Certainly the low leucocyte count suggests a possible destructive action on the white cell formation. The stricture in this patient was of 15 years' duration. To maintain bowel movement, she was in the habit of taking magnesium sulfate after each meal to assure a liquid stool. Many different treatments had been used during the 15-year period but without results. At the time of this report, after 2 weeks' additional treatment, the stricture is reduced so that the examining finger can be passed through readily without causing any discomfort to the patient.

TABLE 2.—*Summary of treatment of 2 cases of lymphopathia venerum with sodium sulfanilyl sulfanilate (I) followed by sodium sulfanilate (II)*

Patient	Compound	Serum albumin (percent)	Serum globulin (percent)	Duration of treatment (weeks)	Total amount of drug injected (grams)	Hemoglobin (percent) (Sahli stand.)		Leucocyte count		Results
						Before drug	After drug	Before drug	After drug	
W. B.	I	4 8	9 7	18	158	84	93	8,000	6,300	Apparently cured.
	II	-------	-------	14	111	-------	-------	-------	-------	
I. R.	I	4.19	4.38	6.5	143	70	[1] 80	5,550	[1] 3,650	Stricture reduced 50 percent, treatment continues.
	II	-------	-------	6	84	-------	-------	-------	-------	

[1] On Apr. 5, 1939, hemoglobin was 97 percent, W. B. C. 6,800.

A summary of the results of the treatment of 4 cases with sodium sulfanilate is given in table 3. Two of the four cases were cured, treatment being continued 12 and 14 weeks, respectively, and in all cases the time in which there was a change in the stricture, noted first by a softening of the tissues, was shorter than in those treated with sodium sulfanilyl sulfanilate. This was true despite the fact that each dose was only two-thirds as much, in other words, the same volume of a 10 percent solution as compared with a 15 percent solution of sodium sulfanilyl sulfanilate. It would appear, however, that the sodium sulfanilate has some destructive action against blood cells, particularly the leucocytes.

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TABLE 3.—*Summary of treatment of 4 cases of lymphopathia venereum with sodium sulfanilate*

Patient	Serum albumin (percent)	Serum globulin (percent)	Duration of treatment (weeks)	Total amount of drug injected (grams)	Hemoglobin (percent) (Sahli stand.)		Leucocyte count		Results
					Before drug	After drug	Before drug	After drug	
M. B.	3.5	5.14	12	270	38	62	5,250	9,100	Stricture absorbed.
L. J.	3.13	4.52	14	110	78	76	5,650	3,650	Do.
B. S.	1.16	10.24	7.5	125.5	55	55	10,050	8,000	Stricture reduced 50 percent; treatment continues.
L. S.	2.94	5.66	26	249	60	70	8,700	3,350	Stricture reduced 75 percent; treatment continues.

The treatment in all these cases was followed by general improvement in health, increased appetite, increase in weight, and the absorption of strictural tissue. The mechanism of cure and general improvement in health is purely speculative, and yet it may be assumed that both drugs cause destruction of the virus, and that absorption of strictural tissue with return to normal bowel function follows the destruction of the infective agent.

CASES OF ULCERATIVE COLITIS

Case 1.—A. C., white male, aged 20, was in the hospital from June 7 to July 19, 1938. Onset of illness was 16 months prior to admission. For the preceding 3 months stools had been watery, there was pain in epigastrium 1 hour after meals and occasionally during the night, and weight had decreased from 160 to 130 pounds. Patient became so weak that he was compelled to go to bed. Proctoscopic examination showed inflammation, as high as 20 cm., with bleeding ulceration. Wassermann test was negative. Diagnosis was chronic ulcerative colitis. Despite the usual methods of treatment of this disease, the patient became worse, losing weight and strength very rapidly. On June 30, 1938, weight was 109 pounds. A transfusion and intravenous injection of glucose were resorted to as sustaining measures. He continued to have six bloody watery stools daily. On July 7 treatment with sodium sulfanilyl sulfanilate was begun, and on the fourth day of treatment great improvement in general condition was noted. No blood was found in the stool after the fifth day. By the seventh day, stools were well formed. On the thirteenth day, no lesions were observed by proctoscopic examination. The patient was discharged on July 19, 1938, weighing 125 pounds, and having only two stools daily with no blood. Thus far, 30 grams of sodium sulfanilyl sulfanilate had been administered. On September 24 the patient returned with history of blood in stool, and on examination small hyperemic areas

were noted, but no ulceration as high as 20 cm. Appetite was good and weight was 140 pounds. On September 24 treatment was begun again with the same drug and continued until December 17, 85 days, a total of 121 grams being given. On October 25 proctoscopic examination showed red granular mucosa with no ulceration. Patient seemed well, and was having normal bowel movements, but still with some blood in stools. Hemorrhoidectomy was done because of the possibility that blood came from this source. The patient was apparently cured.

Case 2.—M. M., white female, aged 61, was in the hospital from June 6 to June 23, 1938, and from July 21 to August 10, 1938. In May 1938 diarrhea began, with 6 to 12 stools in 24 hours. Blood appeared in stools and cramping pains in abdomen. Barium enema showed narrowing and spasticity of the rectal-sigmoidal junction, suggesting ulcerative lesions. Proctoscopic examination showed ulcerative lesions in lower sigmoid and rectum. No amoebae were found in stool, but blood was present. Wassermann test was negative. Diagnosis was chronic ulcerative colitis. Patient improved for a short time with aluminum hydroxide and kaolin treatment, but the ulcer was still present at the rectal-sigmoid junction on July 22. Treatment was then begun with daily injections of sodium sulfanilyl sulfanilate, a total of 35 grams being given. Repeated proctoscopic examinations showed a gradual healing process, and on August 8, 1938, ulcers had healed. On March 29, 1939, patient reported no further symptoms, and was apparently completely cured.

Case 3.—W. W., white male, aged 48, was in the hospital from November 7 to December 8, 1938. Present illness began a year ago with four or five stools a day, and frequent movements during the night. No pain, tenesmus, or bladder disorders were felt. Some night sweats occurred. The patient lost 35 pounds. Proctoscopic examination revealed superficial ulcers, some exudate, and marked inflammation of mucosa. Wassermann test was negative. Diagnosis was early ulcerative colitis. On November 10, 1938, treatment was begun with sodium sulfanilyl sulfanilate and continued until March 22, 1939, 132 days, a total of 209 grams being administered. Proctoscopic examinations from time to time showed a gradual healing process, with accompanying improvement in bowel movements, which diminished to two daily, and sleep at night was uninterrupted. The patient was greatly improved.

Case 4.—R. E., white female, aged 31, was in the hospital off and on from 1935 to 1938, with diagnosis of chronic ulcerative colitis, as shown by proctoscopic examination. Onset of illness occurred in 1932, with frequent stools, mucus, and blood. Patient had lost 35 pounds in the 3 years prior to first admission. She suffered slight fever from time to time, also edema of ankles and severe abdominal cramps,

and 8 to 40 stools a day. She had been given nearly every drug ever used in the treatment of colitis, but with no permanent improvement. Wassermann test was negative. On August 2, 1938, treatment with sodium sulfanilyl sulfanilate was begun and continued until December 22, 1938, 143 days, a total of 65.7 grams being given. The drug was somewhat toxic for the patient, as indicated by severe abdominal cramps and aggravation of condition. However, treatment was continued and the number of stools decreased to 3 or 4 a day, later followed by 1 or 2 well-formed stools. This condition has continued to time of this report. The patient's general health was greatly improved and the chronic ulcerative colitis was apparently cured.

These four cases of ulcerative colitis which apparently responded to sodium sulfanilyl sulfanilate suggest the possibility that this disease may be caused by a virus. Of course, before definite proof of the efficacy of this drug is established, a larger series of patients so treated must be studied. Hence, its general use is not advocated at present. It is realized that the disease is chronic, and, as shown by Mackie (*14*), exhibits an inherent tendency to progression and relapse. This author summarizes the general belief that there is no one etiological agent, as follows: "Chronic ulcerative colitis appears to be the complex expression of the interaction of several different factors." It is our intention to continue the use of one or the other of these drugs in the treatment of patients in whom the diagnosis is clearly chronic ulcerative colitis.

DISCUSSION

The number of cases reported is small, but the beneficial and curative action of these agents in the chronic tertiary stage of lymphopathia venereum would seem to make the results significant. Most of these patients have been under observation for over a year, and there can be no question that the majority have been cured by the treatment, as judged by the disappearance of the rectal stricture and the improvement in general health. In some instances, there is a slight residuum suggestive of stroma network which has not yet been entirely absorbed. Whether or not this absorption will ever be complete, at least normal bowel functions have been restored. It is pertinent to point out, however, that the Frei test is still positive in many cases and recurrence is possible. Accordingly, patients should be followed over a period of years and treatment repeated if necessary.

The intravenous route of injection has been used throughout in these reported cases. However, 3 other patients have been treated by mouth with sodium sulfanilate, 12 grams a day in divided doses being given, 3 grams every 4 hours, maintaining the level of 2.5 mg. percent in the blood. Results in these cases would indicate that oral administration would be at least as effective as intravenous injection,

and perhaps the method of choice. If individual variation in absorption does not prevent a constant blood concentration, perhaps the interval of medication may be significantly shortened by oral administration. This has been borne out by one patient in whom stricture, which failed to admit the examining finger, broke down completely in a period of 3 weeks when 12 grams daily of sodium sulfanilate were given orally. Yet, in the patients who received intravenous therapy with either drug, the average interval before any noticeable change occurred in the stricture was 6 weeks. This change was brought about by injections given once or twice daily, and the blood level, although very high for a short period, fluctuated greatly. It may be added that patients do not object to taking sodium sulfanilate in a little water or milk, as the compound is almost tasteless. On the other hand, sodium sulfanilyl sulfanilate is somewhat disagreeable to the taste.

The reactions obtained from intravenous or oral administration were similar to those with sulfanilamide, but certainly not as severe. This might be expected, inasmuch as the toxicity for white mice is less than that of sulfanilamide. This is particularly true of sodium sulfanilate which has been found to be about one-fourth as toxic. Although the number of cases treated in this series is small, the actual number of treatments during the long periods of medication is sufficiently large to offer significant evidence as to the type of reaction following administration of either of these two drugs.

The symptoms observed in the various patients were occasional abdominal pains, chills, headaches, and dizziness with a feeling of lassitude. One patient suffered an extensive rash lasting for 2 weeks; the rash had the appearance of that seen in ivy poisoning. Two patients vomited following intravenous injection. All these symptoms were relatively light, and at no time were they considered alarming. In the patients treated with sodium sulfanilate intravenously, the above symptoms were absent. It is to be remembered, however, that the dose of this drug was one-third less than that of sodium sulfanilyl sulfanilate. The milder reactions following treatment with sodium sulfanilate are indicated in the 2 patients in whom it was used after sodium sulfanilyl sulfanilate, which had caused some discomfort and irritation of the intestine. Again, this relatively milder toxicity of sodium sulfanilate was brought out in the reactions obtained in the treatment of the 4 cases of ulcerative colitis. With both drugs, the dose had to be reduced to about half that used in the cases of lymphopathia venereum because of intestinal irritation following each administration. Yet this irritative effect has been observed less often with sodium sulfanilate. It is noteworthy that with the doses used blood hemoglobin content not only was not decreased, but in reality increased. With sodium sulfanilyl sulfanilate the number of white cells

was not reduced, nor were there any abnormal cells observed. With sodium sulfanilate, although the leucocyte count was somewhat reduced after prolonged treatment, there was no evidence of bone marrow degeneration.

From this preliminary paper no conclusions may be drawn as to the relative merits of the two drugs. Much must be learned as to the optimum blood concentration necessary to give the desired effect, as well as the route and mode of medication. Inasmuch as our purpose was to ascertain whether a virus disease of human beings could be influenced by a chemotherapeutic compound, for the most part one route of injection (intravenous) was used in these patients. Our experience would indicate that each individual case must be studied to ascertain the highest dose that will be tolerated without untoward effect. In the present series, this was done by injecting 5 cc. of a 15-percent solution (of sodium sulfanilyl sulfanilate) for the first dose, 10 cc. for the second, 20 cc. for the third, and if possible 30 cc. for the fourth dose. The last was too large a dose for most patients. In determining the tolerated dose, reactions such as intestinal cramps, pain in the epigastrium, and a feeling of suffocation would indicate an overdose. With oral administration the same general procedure is advocated, beginning with 0.5 gram of the drug, dissolved in a little water or milk, after each meal and at bedtime, one gram in each dose on the second day, 2 grams on the third day, and on the fourth day 3 grams. An effective blood level concentration was found to be 2.5 mg. percent for oral administration of sodium sulfanilate. Whatever the method of medication, it must be emphasized that blood studies should be made repeatedly, at frequent intervals, and if signs of cell degeneration occur, the dose should be reduced, or the drug discontinued until the blood picture becomes normal.

If these observations are substantiated by successful treatment of a significantly large number of patients in the tertiary stage of lymphopathia venereum, then the use of a chemotherapeutic agent would be established as a cure for the chronic state of a virus disease. However, inasmuch as sulfanilamide, among other drugs, has already been used successfully in the earlier stages of this disease, it would seem a more logical procedure to attempt to cure the disease before it had advanced to the chronic tertiary stage. Such a program, making use of sulfanilamide, sodium sulfanilate, or sodium sulfanilyl sulfanilate, would readily determine whether these compounds kill the virus. If the drugs are effective, then the disease in individuals so treated would not progress to the teritary stage, for which no satisfactory treatment had been found up to the time of the present report.

SUMMARY AND CONCLUSIONS

Fourteen cases of lymphopathia venereum, diagnosed by positive Frei test, with demonstration of rectal stricture and high globulinemia,

were cured or greatly improved by prolonged treatment of 6 to 35 weeks with either sodium sulfanilyl sulfanilate or sodium sulfanilate, or both, as indicated by cessation of the bloody purulent discharge, disappearance of fistulae, or lympheroids, and absorption of the rectal stricture. Four of the cases, in which colostomy had previously been performed with no improvement, responded to treatment with closure and healing of colostomy and restoration of normal bowel function.

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THE PROTECTION OF MICE AGAINST *HEMOPHILUS INFLUENZAE* (NON-TYPE-SPECIFIC) WITH SULFAPYRIDINE

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During the past few years many bacterial infections have been given trial treatment with one or more of the newly compounded drugs (see review by Reimann (*1*)). The present report adds to the list one more experimental bacterial infection which responded favorably to treatment. This infection, induced in mice with *Hemophilus*

influenzae, non-type-specific, was treated with sulfapyridine. There have been several reports of the use of drugs in the treatment of *Hemophilus influenzae* meningitis, which is usually caused by type-specific strains (*2*) but the results as a whole have been equivocal (see review by Bilger and Haralambie (*3*)).

Interest in this experimental study was aroused by the favorable response, following treatment with sulfapyridine, of a baby suffering from an apparent *Hemophilus influenzae* infection. The baby was a patient of Dr. J. H. McLeod, who has kindly given permission for the publishing of a brief history.

The baby, 8 months old, developed conjunctivitis which was followed by an upper respiratory infection, double otitis media, and pneumonia. Two days before the onset of pneumonia a pure culture of *Hemophilus influenzae* was isolated from the eyes. A throat culture made at that time showed the same microorganism to be present in large numbers. It was also the predominating organism in the sputum after the development of pneumonia. A few pneumococci, which were not of Type I–XXXII, were also present in the throat and sputum cultures. Treatment with sulfapyridine was begun after the onset of pneumonia. Within 24 hours the child showed marked improvement, followed by a rapid and uneventful recovery.

The culture of *Hemophilus influenzae* was in all respects typical of the strains that are generally isolated from respiratory infections. These strains are not encapsulated and consequently are devoid of type specificity as determined by capsular carbohydrate. They are, therefore, different from the strains usually isolated from meningitis, which are encapsulated and type-specific.

Although the common respiratory strains do not have a capsule, they are at least sometimes pathogenic ((*4*) and others). Not infrequently they are isolated in practically pure culture or as the predominating organism from upper respiratory infections, or even from pneumonia. Moreover, *Hemophilus influenzae* was certainly at times actively associated with influenzal pneumonia during the 1918–19 pandemic of influenza (*5*). It is not known, however, whether the strains associated with influenza were type-specific or not, but the present knowledge of this organism leads some to think that they were not type-specific. Furthermore, in rare instances the non-type-specific strain may cause meningitis (*2*).

In the present investigation only non-type-specific *Hemophilus influenzae* was used. Type-specific cultures were not included.

MATERIALS AND METHODS

Culture.—The *Hemophilus influenzae* culture (No. 544) was isolated on April 26, 1939. It was frequently passed through mice and

between passages it was kept on rabbit blood agar slants at 37° C. All of the experimental work was done within 6 weeks after the primary isolation. The virulence of the culture was such that 1 cc. of a 10^{-6} dilution of a broth culture in 3.5 percent mucin solution was lethal for a mouse. Two percent proteose peptone solution containing 1 percent Fildes' peptic digest blood (*6*) was employed for broth medium.

One cc. of a 10^{-4} dilution of an 18-hour broth culture, in 3.5 percent mucin, was used as the infective dose in determining the action of the drug. This amount was equivalent to at least 100 minimal fatal doses. The inoculations were made intraperitoneally 30 minutes after the administration of the drug. Virulence titrations of the culture were made in each experiment.

Drug.—Sulfapyridine was suspended in 5 percent gum arabic about 30 minutes before using. The suspensions were so prepared that the desired dose was contained in a volume of 0.4 cc. They were administered into the stomach by means of a silver eustachian catheter, child's size, attached to a tuberculin syringe. Except in a few instances, only one dose of drug was given.

Mice.—Inbred albino Swiss mice weighing 16 to 18 grams were used. In the majority of the tests only males were employed.

PROTECTION OF MICE WITH SULFAPYRIDINE

Several experiments were made to determine the influence of sulfapyridine on *Hemophilus influenzae* infections in mice. The results of three experiments are given in table 1. It is shown that the survival of mice was directly proportional to the amount of drug administered. None survived which received only 1 mg.; 20 to 40 percent of those receiving 2 mg. survived, as did 40 to 80 percent of those receiving 4 mg., and 70 to 100 percent receiving 8 mg. Furthermore, those mice which did succumb after receiving the larger amounts of drug lived longer than the control mice. The average survival time of the mice which received 4 mg. was 7 to 11 hours longer than for the controls, while for the mice which received 8 mg. it was two or more times longer than for the controls, that is, 38 and 42 hours, respectively, in contrast to 19 and 18 hours for the controls. In one experiment no mice died which received 8 mg. of the drug.

By means of the Reed and Muench method of estimating 50 percent end-points (*7*) it was calculated that approximately 2.9 mg. of sulfapyridine protected 50 percent of the mice.

In experiments 3 and 5, a series of mice was given two repeated doses of the drug. The results shown in table 1 indicate that this method of treatment would give more protection than one single dose, but the number of mice so treated is too small to permit the drawing of conclusions. The fact, however, that one single dose

seems to afford protection is probably more significant than if repeated doses were required.

TABLE 1.—*The protection of mice against Hemophilus influenzae with sulfapyridine*

Experiment No.	Amount of drug (mg.)	Result			Average time of death (hours)
		Survived	Died	Survival (percent)	
May 17, 1939					
3	1	0	5	0	15
	2	1	4	20	20
	[1]2.6	2	3	40	22
	4	4	1	80	28
	8	5	0	100	----------
	----------	0	5	0	21
May 23, 1939					
4	2	4	6	40	22
	4	7	3	70	30
	8	7	3	70	38
	----------	1	9	10	19
June 7, 1939					
5	2	4	6	40	18
	[2]6	7	3	70	33
	8	7	3	70	42
	----------	0	10	0	18

[1] 3 doses: 1 mg. before culture, 0.8 mg. 6 and 24 hours after culture.
[2] 3 doses: 2 mg. before culture, and 6 and 24 hours after culture.

THE INFLUENCE OF SULFAPYRIDINE ON THE INVASION OF THE BLOOD BY *HEMOPHILUS INFLUENZAE*

In two of the experiments the course of the infection in the mice was followed by repeated blood cultures made from the tip of the tail. The tail was disinfected with alcohol, dried with ether, and snipped; then one loopful of blood was collected and streaked on a chocolate blood agar plate. The course of the blood infections in each experiment was similar. In table 2 the recordings of one experiment are given. It is shown that the drug did not prevent the organisms from invading the blood stream. Within an hour bacteria were present in the blood of the majority of the mice and by the end of 3 hours they were demonstrable in the blood of all except one mouse. At this time the number of bacteria in the blood was not significantly different in the treated or untreated mice. However, at the end of 5 hours there was a noticeable difference. In the controls and in those which received the smaller amounts of drug, 1 or 2 mg., there had been a marked increase in bacteria, while in those that received 4 or 8 mg. there had been only a slight or no increase. Within 24 hours all except two of the mice in the former group were dead, and all in the latter group were living. Nevertheless, each of the mice in the latter group had a bacteriemia, in some a large number of bacteria being present. Only one mouse of this group succumbed, dying 28 hours after inoculation, although five of

the remaining nine still had bacteria in the blood at the end of 48 hours.

TABLE 2.—*The influence of sulfapyridine on the invasion of the blood by Hemophilus influenzae*

Mouse No.	Amount of drug (mg.)	Blood cultures: Hours after inoculation of culture—					Result
		1	3	5	24	48	
1	1	[1] (2)	+	++	---------	---------	D. 14 hours.
2	1	(2)	+	++	---------	---------	D. 23 hours.
3	1	−	+	++	---------	---------	D. 17 hours.
4	1	(2)	+	++	---------	---------	D. 14 hours.
5	1	(2)	+	++	---------	---------	D. 16 hours.
6	2	C	+	++	---------	---------	D. 17 hours.
7	2	−	±	+	---------	---------	D. 23 hours.
8	2	(1)	+	++	---------	---------	D. 22 hours.
9	2	(3)	+	++	---------	---------	D. 19 hours.
10	2	(1)	±	+	+	−	S.
11	4	−	+	+	++++	++	S.
12	4	(3)	+	+	++++	++	S.
13	4	(1)	+	++	++++	---------	D. 28 hours.
14	4	−	(3)	+	(1)	+	S.
15	4	−	−	+	(2)	−	S.
16	8	(2)	±	+	±	−	S.
17	8	(3)	±	±	+	+	S.
18	8	−	±	±	++	(3)	S.
19	8	−	±	+	++	−	S.
20	8	−	±	+	+++	−	S.
21	0	(3)	+	+	---------	---------	D. 22 hours.
22	0	(1)	+	+++	---------	---------	D. 12 hours.
23	0	(1)	±	++	---------	---------	D. 22 hours.
24	0	(4)	±	+	---------	---------	D. 32 hours.
25	0	−	±	+++	---------	---------	D. 19 hours.

[1] Figures in parentheses indicate the actual number of colonies which grew from 1 loopful of blood.
−, ±, +, ++, +++, ++++=None, very few, few, moderate number, many, very many colonies which grew from 1 loopful of blood.
C=Contaminated.
D=Died.
S=Survived.

DISCUSSION

The work presented in this paper clearly indicates that sulfapyridine influenced the course of infection experimentally induced in mice by a non-type-specific strain of *Hemophilus influenzae*. The majority of the mice receiving as much as 4 mg. of drug survived, and if death did occur it was much later than for the controls. The drug, however, did not prevent the bacteria from entering the blood stream. From 1 to 3 hours after inoculation of the culture, treated and untreated mice gave positive blood cultures alike, but after 3 hours more bacteria were present in the cultures from the untreated mice. The latter mice usually died within 24 hours while those treated (4 and 8 mg. of drug) lived longer, the majority of them surviving in spite of heavy infections at the end of 24 hours.

The influence of sulfapyridine on the survival of mice parallels the rapid recovery of the baby following treatment with sulfapyridine. Although this may have been a coincidence, it is obvious that the drug enabled mice to survive. It, therefore, seems justifiable to

suggest that the drug be given further trial in the treatment of non-type-specific *Hemophilus influenzae* infections.

It was not the purpose of this study to determine the mode of action of sulfapyridine on *Hemophilus influenzae*. It is obvious that it was not bactericidal. The fact that the increase of the bacteria in the blood was slower in the treated mice suggests that there was some bacteriostatic action. Nevertheless, some of the treated mice which survived developed a heavy bacteriemia. Repeated doses of the drug might have shown more bacteriostasis. On the other hand, the fact that the majority of the treated mice survived in spite of a bacteriemia suggests that the drug may have had some action on the primary toxicity of the culture. It has been generally observed that when experimental animals are inoculated with *Hemophilus influenzae*, if death results it occurs within a few hours, rarely after 24 hours. That is, if they are able to overcome the primary toxicity of the culture, they usually survive. In certain other infectious diseases, both American and British investigators have largely held the view that sulfanilamide exerts its beneficial effects by limiting or preventing the growth of the bacteria (*1*). Carpenter, Hawley, and Barbour (*8*), however, observed that sulfanilamide protected mice against gonococcal "toxin."

Comment should be made on the high virulence of this culture, which is in contrast to the findings of Chandler, Fothergill, and Dingle (*9*). They studied, with the aid of mucin, the virulence of a number of type-specific and non-type-specific strains, the latter group including converted rough and respiratory strains. They found that the type-specific strains were significantly more virulent than the non-type-specific. The latter were relatively avirulent. It required 1,300,000 organisms of their most virulent respiratory strain to kill 50 percent or more of the injected mice while our strain killed 50 percent or more in a dilution of 1×10^{-6} which contained approximately 500 organisms. This comparison must not be taken too literally, as the methods of growing the culture were different and different preparations of mucin may vary tremendously in their influence on the virulence of bacteria. These authors state, however, that it is possible that an occasional virulent respiratory strain might have been found if a much larger series of strains had been examined. Nevertheless, they seem to be of the opinion that non-type-specific strains are of little significance pathologically.

CONCLUSIONS

1. Sulfapyridine was effective in protecting mice against experimental infections of non-type-specific *Hemophilus influenzae*.

2. The drug did not prevent the bacteria from entering the blood stream but it apparently retarded their increase in the blood.

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POSSIBLE RELATION OF CALCIUM DEFICIENCY TO THE UTILIZATION OF VITAMIN B_1

PRELIMINARY REPORT

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In the studies of the relation of malnutrition to rat leprosy, observations were made which were of interest aside from the subject under investigation. The results obtained to date would indicate that calcium deficient rats are incapable of utilizing the vitamin B_1 available in the diet.

Vitamin B_1 deficient rats have been found to be much more susceptible [1] to rat leprosy than were normal control rats, and rats on the vitamin B_1 deficient diet which received vitamin B_1 in the purified form by mouth were no more susceptible than were the normal control rats.

Calcium deficient rats showed approximately the same susceptibility as did the vitamin B_1 deficient rats.

As a result of these observations the following questions arose:

1. Are vitamin B_1 deficient and calcium deficient rats equally susceptible to the infection?
2. Are vitamin B_1 deficient rats also deficient in calcium?
3. Are the vitamin B_1 deficient rats unable to utilize the calcium in the diet?

[1] The appearance of gross evidence of a generalized infection was employed as a measure of susceptibility.

4. Do the calcium deficient rats receive an adequate intake of vitamin B_1?

5. Are the calcium deficient rats unable to utilize the vitamin B_1 available in the diet?

6. Is the increased susceptibility due to a vitamin B_1 deficiency or to a calcium deficiency, or to a deficiency in both calcium and vitamin B_1?

Several experiments have been conducted in an attempt to answer these questions.

Question 1.—Are vitamin B_1 deficient and calcium deficient rats equally susceptible to rat leprosy? The results obtained in four experiments indicate that they are equally susceptible, as shown by the percentages of rats in each group with gross evidence of a generalized infection.

	Experiment 40 (percent)	*Experiment 50 (percent)*	*Experiment 60 (percent)*	*Experiment 62 (percent)*
Vitamin B_1 deficient	90. 9	100. 0	90. 0	96. 2
Calcium deficient	90. 9	100. 0	80. 9	95. 8
Controls	0	72. 2	20. 8	16. 6

Question 2.—Are vitamin B_1 deficient rats also deficient in calcium? Analysis [2] of the calcium content of the tails of vitamin B_1 deficient rats showed the percentage of calcium to be approximately the same as in those of the control rats, as shown by the following figures.

	Experiment 50 (percent)	*Experiment 60 (percent)*	*Experiment 62 (percent)*
Vitamin B_1 deficient	10. 08	11. 43	11. 02
Controls	9. 08	11. 33	11. 13

There is no apparent calcium deficiency in the vitamin B_1 deficient rats.

Question 3.—Are the vitamin B_1 deficient rats unable to utilize the calcium in the diet? This question may be answered in the negative, since determinations of the calcium in the tails of the vitamin B_1 deficient rats gave the same results as in those of the controls.

Question 4.—Do the calcium deficient rats receive an adequate intake of vitamin B_1? The vitamin B_1 intake of the rats on the calcium deficient diet is apparently adequate. The source of the vitamin B_1 in the calcium deficient diet is in the liver. To check on the vitamin B_1 content of the calcium deficient diet part of the casein in the vitamin B_1 deficient diet was replaced by the liver used in the calcium deficient diet. The gain in weight of the rats fed this test diet was practically identical with that of rats fed the normal control diet.

Question 5.—Are the calcium deficient rats unable to utilize the vitamin B_1 available in the diet? Evidence has been obtained which

[2] The percentage of calcium in a section of the tails with the skin removed.

strongly suggests that calcium deficient rats are incapable of utilizing the vitamin B_1 available in the diet.

Rats maintained on the calcium deficient diet and receiving additional vitamin B_1 in the purified form showed a greater increase in size and weight than did rats maintained on the calcium deficient diet without the additional vitamin B_1. Rats maintained on the calcium deficient diet and receiving both vitamin B_1 and calcium by mouth showed a greater increase in size and weight than did rats maintained on the calcium deficient diet and receiving vitamin B_1 by mouth. Neither the group receiving the vitamin B_1 alone nor the group receiving both vitamin B_1 and calcium showed gains equal to that of the normal control group.

Question 6.—Is the increased susceptibility due to a vitamin B_1 deficiency or to a calcium deficiency, or to a deficiency in both calcium and vitamin B_1? Evidence has been obtained which strongly suggests that the increased susceptibility is due to vitamin B_1 deficiency and not to calcium deficiency.

Vitamin B_1 deficient rats were found to be much more susceptible to rat leprosy than normal rats. Rats maintained on the vitamin B_1 deficient diet which received vitamin B_1 in the purified form by mouth were found no more susceptible than normal rats.

Calcium deficient rats were found much more susceptible to rat leprosy than normal rats and about as susceptible as vitamin B_1 deficient rats. Rats maintained on the calcium deficient diet which received vitamin B_1 in the purified form by mouth were found to be no more susceptible than normal rats.

These observations are illustrated in the following table in which the percentages of rats of the different groups with gross evidence of a generalized infection are given.

	Experiment 60, 16 weeks after inoculation	*Experiment 62, 16 weeks after inoculation*
Vitamin B_1 deficient	90. 0% of 20 rats	96. 2% of 27 rats
Vitamin B_1 deficient receiving vitamin B_1	0. 0% of 23 rats	11. 5% of 26 rats
Calcium deficient	80. 9% of 21 rats	95. 8% of 24 rats
Calcium deficient receiving vitamin B_1	----------	14. 2% of 28 rats
Controls	20. 8% of 24 rats	16. 6% of 30 rats

Although vitamin B_1 deficient rats were much more susceptible than normal rats, the percentage of calcium in the tails was the same as in normal rats. Although calcium deficient rats which received vitamin B_1 in the purified form by mouth were no more susceptible than normal rats, the percentage of calcium in the tails was much less than in normal rats.

In one experiment, analysis, after 11 weeks on the diets, showed the average percentage of calcium in the tails of 23 vitamin B_1 deficient rats to be 11.43, while it was 11.30 in the tails of 24 control rats.

In another experiment, after 10 weeks on the diets, the average per-

centage of calcium in the tails of 30 vitamin B_1 deficient rats was 11.02; of 27 calcium deficient rats, 7.02; of 29 calcium deficient rats receiving vitamin B_1, 4.67; and of 30 control rats, 11.13.

In the same experiment, after 19 weeks on the diets, the average percentages of calcium in the tails of 10 rats of each group were as follows: Vitamin B_1 deficient, 13.2; calcium deficient, 5.1; calcium deficient receiving vitamin B_1, 4.67; controls, 13.3.

The amount of vitamin B_1 in the circulating blood of calcium deficient rats was found to be approximately the same as in the blood of vitamin B_1 deficient rats. Determinations[3] showed that the blood of the vitamin B_1 deficient rats contained an average of 2.5 micrograms of vitamin B_1, while that of the calcium deficient rats contained an average of 2.3 micrograms per cubic centimeter of blood. The blood of calcium deficient rats receiving an additional amount of vitamin B_1 in the purified form contained an average of 17.5 micrograms of vitamin B_1 per cubic centimeter, while that of the vitamin B_1 deficient rats receiving an additional amount of vitamin B_1 contained but 11.5 micrograms per cubic centimeter. This difference in the determinations in these two groups may possibly be explained by the fact that, in addition to the vitamin B_1 administered, there was also vitamin B_1 present in the calcium deficient diet.

According to the determination of the amount of vitamin B_1 in the blood, the rats fed the calcium deficient diet were also deficient in vitamin B_1 and were incapable of utilizing the vitamin B_1 available in the diet.

These findings strongly suggest that the increased susceptibility is due to vitamin B_1 deficiency and not to a calcium deficiency. The vitamin B_1 deficient rats are not deficient in calcium, as shown by chemical analysis of the tails, and the calcium deficient rats are deficient in vitamin B_1, as shown by the determinations of the amount of vitamin B_1 in the blood. The administration of vitamin B_1 to either group, the vitamin B_1 deficient or the calcium deficient, causes them to be no more susceptible to the infection than are normal rats, yet the amount of calcium in the tails of the calcium deficient rats receiving the vitamin B_1 is below that of the calcium deficient rats. The vitamin B_1 deficiency in the calcium deficient rats is apparently brought about by the inability of these rats to utilize the vitamin B_1 available in the diet.

DIETS EMPLOYED

The diets employed in these experiments were as follows:

Calcium deficient.—Beef liver 20, casein (purified) 10, sodium chloride 1, potassium chloride 1, corn starch 65, butter fat 3 (McCollum,

[3] The method employed to determine the amount of vitamin B_1 in the blood was that of Meiklejohn as used by Rowlands and Wilkinson, with slight modification. (Rowlands, E. N., and Wilkinson, J. F.: Brit. Med. J., 2: 878 (Oct. 29, 1938).)

Simmonds, Parsons, and Park: J. Biol. Chem., **45**:353 (1921) (slightly modified).

Vitamin B_2 deficient.—Casein (purified) 18, Wesson oil 3, cod liver oil 2, salt mixture 4, autoclaved yeast 15, corn starch 58.

COURT DECISION ON PUBLIC HEALTH

Fixing of term of city health officer.—(New Jersey Supreme Court; *Larkey* v. *City of Bayonne et al.*, 8 A.2d 68; decided August 8, 1939.) An ordinance of the city of Bayonne, adopted in April 1938, fixed the term of the city health officer at 5 years and imposed upon such officer the duty of enforcing the sanitary code and all other ordinances relating to the public health. An ordinance, adopted in January 1939, repealed such earlier ordinance. A proceeding to test the validity of these two ordinances was instituted by the prosecutor, who had been duly appointed as health officer in November 1938. The statute involved provided as follows:

> The local board [of health] may employ such personnel as it may deem necessary, including health officers, sanitary inspectors, and plumbing inspectors, to carry into effect the powers vested in it. It shall fix the duties, term, and compensation of every appointee. The appointee, agents, and officers of a local board shall hold their offices during the term for which they are severally appointed, and shall not be removed except for cause and after an opportunity has been given them for a hearing. Any duly appointed health officer shall, during the term of his appointment and subject to the superior authority of the local board appointing him, be its general agent for the enforcement of its ordinances and the sanitary laws of the State within the territorial jurisdiction of the board.

The supreme court in its opinion stated that the provisions of the said statute applied "to municipalities like Bayonne operating under the commission government" and that "The legislature having conferred on the municipality authority to fix the term without limitation, the cases, to the effect that the board of commissioners being a noncontinuous body cannot fix a term extending beyond its life, are inapplicable." The court also quoted from a prior case in which it was said that "an office or position which is created by municipal ordinance or resolution adopted pursuant to power conferred by the legislature upon the governing body for that purpose is just as much created by law, and its term, when fixed by such ordinance or resolution, is just as much fixed by law, as if the legislature itself had acted in the premises."

Concluding, the court held that, the record disclosing that the 1938 ordinance was properly and lawfully adopted pursuant to legislative power, the repealing ordinance of 1939 was, therefore, invalid insofar as it affected the prosecutor's term.

170191°

DEATHS DURING WEEK ENDED SEPTEMBER 9, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 9, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,117	6,737
Average for 3 prior years	[1] 6,854	
Total deaths, first 36 weeks of year	301,250	294,413
Deaths under 1 year of age	456	477
Average for 3 prior years	[1] 488	
Deaths under 1 year of age, first 36 weeks of year	18,141	19,054
Data from industrial insurance companies:		
Policies in force	66,735,832	68,305,733
Number of death claims	7,914	8,320
Death claims per 1,000 policies in force, annual rate	6.2	6.4
Death claims per 1,000 policies, first 36 weeks of year, annual rate	10.3	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (---) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934-38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934-38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934-38, median
NEW ENG.												
Maine	6	1	0	0	12	2	-----	-----	42	7	1	0
New Hampshire	0	0	0	0	-----	-----	-----	-----	20	2	2	0
Vermont	0	0	4	2	-----	-----	-----	-----	27	2	0	1
Massachusetts	2	2	2	6	-----	-----	-----	-----	26	22	21	17
Rhode Island	0	0	0	0	-----	-----	-----	-----	84	11	2	2
Connecticut	6	2	0	1	-----	-----	1	1	9	3	5	4
MID ATL.												
New York	4	11	20	15	[1] 3	[1] 4	[1] 4	[1] 4	24	60	46	46
New Jersey	1	1	8	8	4	3	7	7	7	6	27	20
Pennsylvania	9	17	19	22	-----	-----	-----	-----	8	16	23	33
E. NO. CEN.												
Ohio	12	16	14	14	5	7	-----	15	13	17	7	8
Indiana	21	14	9	13	25	17	6	9	1	1	1	2
Illinois	11	17	18	23	3	5	7	7	13	20	9	18
Michigan [3]	2	2	7	11	2	2	1	-----	0	0	52	13
Wisconsin	0	0	2	2	46	26	10	10	77	44	30	40
W. NO. CEN.												
Minnesota	0	0	4	4	-----	-----	3	2	12	6	18	6
Iowa	6	3	1	2	-----	-----	7	-----	14	7	4	3
Missouri	17	13	25	25	-----	-----	1	14	6	5	3	5
North Dakota	0	0	1	1	29	4	2	2	15	2	8	3
South Dakota	38	5	8	1	38	5	2	-----	45	6	0	0
Nebraska	4	1	2	3	-----	-----	-----	-----	8	2	7	1
Kansas	31	11	5	9	-----	-----	1	1	25	9	8	4
SO. ATL.												
Delaware	0	0	0	0	-----	-----	-----	-----	20	1	0	0
Maryland [2]	6	2	6	6	3	1	2	2	6	2	9	5
Dist. of Col	16	2	0	2	-----	-----	-----	-----	0	0	1	0
Virginia	81	43	52	33	79	42	-----	-----	17	9	2	6
West Virginia	27	10	11	16	24	9	13	14	19	7	0	3
North Carolina [3]	105	72	107	72	-----	-----	1	1	6	4	29	18
South Carolina [3]	33	12	31	18	325	119	137	104	19	7	10	1
Georgia [3]	63	38	39	30	22	13	-----	-----	7	4	0	0
Florida [3]	21	7	8	10	-----	-----	1	1	0	0	3	3

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	14	8	27	29			7	7	28	16	12	12
Tennessee	39	22	20	34	16	9	9	9	7	4	2	3
Alabama [3]	72	41	33	33	14	8	7	13	0	0	19	2
Mississippi [2 3]	66	26	26	21								0
W. SO. CEN.												
Arkansas	62	25	19	17	15	6	16	5	25	10	5	0
Louisiana [3]	34	14	6	10	2	1	2	3	2	1	17	8
Oklahoma	16	8	8	8	32	16	37	10	4	2	2	1
Texas [3]	33	40	48	33	36	44	83	25	32	39	8	9
MOUNTAIN												
Montana	0	0	0	1			1	1	47	5	11	8
Idaho	10	1	1	0			1		51	5	4	0
Wyoming	0	0	0	0					0	0	1	1
Colorado	5	1	17	7	24	5			0	0	5	4
New Mexico	0	0	2	2			1		12	1	1	2
Arizona	0	0	2	2	221	18	23	15	25	2	3	1
Utah [3]	0	0	0	0			3		70	7	3	3
PACIFIC												
Washington	0	0	2	0	3				148	48	5	11
Oregon	5	1	0	0	45	9	11	10	15	3	10	7
California	12	15	28	22	8	10	13	13	31	38	145	38
Total	20	504	642	642	18	385	420	371	19	463	591	577
37 weeks	15	13,739	16,640	16,675	195	153,176	47,715	105,458	382	350,169	763,061	670,967

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	4	30	5	5	6
New Hampshire	0	0	0	0	0	0	0	0	0	0	0	1
Vermont	0	0	0	0	0	0	1	1	40	3	9	3
Massachusetts	1.2	1	2	1	5	4	0	4	21	18	28	45
Rhode Island	0	0	0	0	8	1	0	0	8	1	0	4
Connecticut	0	0	1	0	3	1	1	2	21	7	14	12
MID. ATL.												
New York	1.6	4	7	7	46	116	8	14	25	62	70	100
New Jersey	0	0	0	2	33	28	8	3	14	12	13	17
Pennsylvania	1.5	3	3	5	21	41	5	8	31	61	78	82
E. NO. CEN.												
Ohio	0.8	1	0	2	10	13	0	17	61	80	58	94
Indiana	0	0	2	1	9	6	0	2	45	30	34	37
Illinois	0.7	1	1	2	10	16	3	18	34	52	94	101
Michigan [3]	1.1	1	1	3	64	61	5	16	62	59	127	81
Wisconsin	0	0	0	1	4	2	2	8	98	56	39	55
W. NO. CEN.												
Minnesota	0	0	0	0	116	60	6	8	47	24	27	23
Iowa	0	0	2	0	24	12	3	4	38	19	20	24
Missouri	0	0	1	2	2.6	2	0	4	32	25	29	30
North Dakota	0	0	0	0	7	1	0	0	44	6	5	5
South Dakota	8	1	0	0	15	2	2	2	98	13	8	10
Nebraska	0	0	0	0	19	5	0	1	42	11	11	10
Kansas	6	2	0	0	11	4	0	3	50	18	58	32
SO. ATL.												
Delaware	0	0	1	0	0	0	1	0	59	3	6	3
Maryland [3]	3	1	1	1	3	1	1	3	40	13	9	15
Dist. of Col.	0	0	0	0	8	1	5	2	16	2	8	8
Virginia	1.9	1	0	1	6	3	2	4	37	20	23	23
West Virginia	5	2	0	3	0	0	0	4	91	34	31	31
North Carolina [3]	2.9	2	0	0	4	3	0	2	91	62	46	44
South Carolina [3]	0	0	0	0	14	5	0	0	25	9	13	8
Georgia [3]	0	0	1	0	0	0	2	2	35	21	10	10
Florida [3]	0	0	2	0	12	4	1	0	12	4	4	4
E. SO. CEN.												
Kentucky	0	0	0	2	16	9	1	4	59	34	53	48
Tennessee	0	0	1	3	0	0	0	3	49	28	23	25
Alabama [3]	1.8	1	2	2	1.8	1	5	3	33	19	15	17
Mississippi [2] [3]	2.5	1	2	0	5	2	6	4	15	6	6	8
W. SO. CEN.												
Arkansas	0	0	0	0	2.5	1	0	1	22	9	3	3
Louisiana [3]	0	0	1	1	0	0	0	1	17	7	4	4
Oklahoma	2	1	2	1	2	1	2	2	18	9	15	9
Texas [3]	0.8	1	1	1	10	12	2	2	21	25	35	19
MOUNTAIN												
Montana	9	1	1	0	0	0	0	1	94	10	15	15
Idaho	0	0	0	0	0	0	1	1	20	2	3	1
Wyoming	22	1	0	0	0	0	0	0	65	3	3	4
Colorado	0	0	0	0	87	18	1	1	96	20	4	9
New Mexico	0	0	0	0	90	8	1	1	74	6	10	6
Arizona	12	1	0	0	98	8	0	3	0	0	2	2
Utah [2]	0	0	0	0	40	4	0	0	149	15	7	13
PACIFIC												
Washington	0	0	0	0	3	1	1	2	52	17	20	14
Oregon	0	0	0	0	10	2	0	2	50	10	22	16
California	0	0	0	1	34	42	2	19	59	72	65	75
Total	1.1	27	35	53	20	501	73	310	41	1,022	1,182	1,298
37 weeks	1.6	1,479	2,285	4,389	4	3,955	1,236	5,292	129	119,962	140,899	168,788

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases	1934–38, median	Sept. 16, 1939, rate	Sept. 16, 1939, cases	Sept. 17, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	0	1	211	35	21
New Hampshire	0	0	0	0	0	0	1	1	0	0	0
Vermont	0	0	0	0	0	0	0	0	483	36	27
Massachusetts	0	0	0	0	6	5	3	4	158	134	105
Rhode Island	0	0	0	0	0	0	2	1	237	31	7
Connecticut	0	0	0	0	12	4	7	4	205	69	50
MID. ATL.											
New York	0	0	0	0	8	21	24	31	163	408	[1] 313
New Jersey	0	0	0	0	13	11	5	12	161	135	306
Pennsylvania	0	0	0	0	6	11	37	45	169	332	226
E. NO. CEN.											
Ohio	0	0	1	0	15	19	23	51	125	162	43
Indiana	4	3	2	1	13	9	9	13	67	45	12
Illinois	5	7	0	0	54	82	16	20	180	275	428
Michigan [2]	0	0	0	0	7	7	16	13	180	170	330
Wisconsin	2	1	0	1	0	0	2	3	243	138	303
W. NO. CEN.											
Minnesota	0	0	0	0	2	1	2	5	140	72	25
Iowa	18	9	1	1	4	2	9	5	14	7	22
Missouri	1	1	0	0	32	25	14	31	24	19	9
North Dakota	0	0	1	0	15	2	1	1	231	32	46
South Dakota	8	1	1	0	15	2	0	1	30	4	4
Nebraska	4	1	0	1	0	0	0	0	23	6	10
Kansas	0	0	2	0	8	3	10	10	98	35	37
SO. ATL.											
Delaware	0	0	0	0	39	2	2	1	157	8	8
Maryland [2]	0	0	0	0	9	3	11	15	120	39	39
Dist. of Col.	0	0	0	0	40	5	6	1	210	26	5
Virginia	0	0	0	0	28	15	13	25	52	28	22
West Virginia	0	0	0	0	43	16	33	23	5	2	39
North Carolina [3]	0	0	1	1	6	4	14	14	115	79	174
South Carolina [3]	0	0	0	0	30	11	19	15	38	14	76
Georgia [3]	0	0	0	0	13	8	11	20	23	14	17
Florida [3]	0	0	0	0	15	5	3	3	33	11	21
E. SO. CEN.											
Kentucky	0	0	2	0	52	30	36	38	68	39	41
Tennessee	0	0	2	0	21	12	16	37	58	33	16
Alabama [3]	0	0	1	0	16	9	20	18	26	15	11
Mississippi [2] [3]	0	0	0	0	10	4	9	9			
W. SO. CEN.											
Arkansas	2	1	0	0	35	14	25	13	12	5	4
Louisiana [3]	0	0	0	0	36	15	10	17	89	37	10
Oklahoma	16	8	3	0	46	23	27	20	22	11	7
Texas [3]	0	0	0	0	41	49	55	46	39	47	88
MOUNTAIN											
Montana	19	2	0	0	9	1	6	3	66	7	40
Idaho	0	0	2	0	31	3	4	6	0	0	3
Wyoming	0	0	0	0	153	7	0	0	87	4	7
Colorado	34	7	3	2	19	4	7	5	53	11	27
New Mexico	0	0	1	0	12	1	17	16	568	46	15
Arizona	0	0	0	0	37	3	6	3	184	15	4
Utah [2]	0	0	0	0	0	0	0	0	437	44	30
PACIFIC											
Washington	0	0	16	5	6	2	7	6	49	16	20
Oregon	0	0	2	0	35	7	2	5	80	16	47
California	1	1	1	1	7	8	19	13	71	87	162
Total	2	42	42	35	19	468	559	633	113	2,799	3,287
37 weeks	5	4,763	12,852	6,189	10	9,211	10,442	10,614	150	137,038	158,315

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Sept 16, 1939, 82 cases as follows: North Carolina, 2; South Carolina, 13; Georgia, 23; Florida, 8; Alabama, 6; Mississippi, 3; Louisiana, 10; Texas, 17.

ROCKY MOUNTAIN SPOTTED FEVER

Cases reported by States, Feb. 26 to Sept. 23, 1939

State	Feb. 26 to Mar. 25	Mar. 26 to Apr. 22	Apr. 23 to May 20	May 21 to June 17	June 18 to July 15	July 16 to Aug. 12	Aug. 13 to Sept. 9	Week ended Sept. 16	Week ended Sept. 23
Eastern:									
New York	-------	-------	-------	3	3	1	1	1	-------
New Jersey	-------	-------	-------	4	8	7	8	1	-------
Pennsylvania	-------	-------	-------	6	3	4	1	-------	-------
Delaware	-------	-------	-------	3	-------	-------	1	-------	-------
Maryland	-------	-------	7	13	11	23	12	-------	1
District of Columbia	-------	-------	2	2	2	3	2	-------	-------
Virginia	-------	-------	1	13	10	11	11	1	-------
West Virginia	-------	-------	-------	-------	-------	1	-------	-------	-------
North Carolina	-------	-------	-------	3	13	13	6	-------	1
Georgia	-------	-------	-------	-------	1	1	-------	-------	-------
Central:									
Ohio	-------	-------	-------	3	2	4	3	-------	-------
Indiana	-------	-------	-------	2	1	3	5	1	-------
Illinois	-------	-------	1	1	5	7	1	-------	1
Kentucky	-------	-------	-------	-------	-------	-------	6	1	-------
Tennessee	-------	-------	-------	-------	5	5	9	2	2
Iowa	-------	-------	1	10	9	6	1	-------	-------
Missouri	-------	-------	-------	1	-------	4	4	-------	-------
Western: [2]									
Montana	[1] 2	2	8	5	1	2	1	-------	-------
Idaho	-------	4	7	4	5	-------	-------	-------	-------
Wyoming	-------	3	14	16	5	5	-------	-------	-------
Colorado	-------	2	3	9	4	-------	-------	-------	-------
Utah [2]	-------	2	5	5	6	2	-------	-------	-------
Washington	-------	2	3	2	-------	-------	-------	-------	-------
Oregon	-------	9	16	7	2	1	-------	-------	-------

[1] 1 other case was reported in Montana as occurring in February, exact date not given.
[2] Publication of 1 case each in Arizona and Utah, week ended Aug 26, 1939, Public Health Reports, Sept. 15 and 22, pp. 1699 and 1739, was an error, no cases being reported in those States during that week.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
August 1939										
Arkansas	57	50	1,127	11	1	97	8	38	4	124
Colorado	44	18	3	26	1	-------	12	60	2	13
Maine	0	3	1	22	0	-------	0	36	0	4
Michigan	34	12	8	120	3	-------	389	275	3	52
New York	37	-------	20	479	9	-------	199	253	1	56
North Dakota	6	-------	1	7	1	-------	3	19	2	6
Pennsylvania	71	-------	2	159	18	-------	76	238	0	83
South Dakota	18	5	-------	9	0	-------	0	30	4	5
Tennessee	28	43	256	23	3	15	8	61	1	88
Vermont	0	-------	-------	44	0	-------	2	9	0	3

Summary of monthly reports from States—Continued

August 1939

	Cases
Anthrax:	
North Dakota	2
Pennsylvania	1
Chickenpox:	
Arkansas	8
Colorado	9
Maine	9
Michigan	138
New York	364
North Dakota	17
Pennsylvania	238
South Dakota	13
Tennessee	4
Vermont	28
Dysentery:	
Arkansas (amoebic)	7
Arkansas (bacillary)	39
Colorado (amoebic)	1
Colorado (bacillary)	18
Michigan (amoebic)	4
Michigan (bacillary)	13
Michigan (unspecified)	3
New York (amoebic)	6
New York (bacillary)	143
Pennsylvania (bacillary)	7
Tennessee (amoebic)	1
Tennessee (bacillary)	34
Encephalitis (epidemic or lethargic):	
Arkansas	1
Colorado	17
Maine	1
Michigan	3
New York	18
North Dakota	4
Pennsylvania	2
Tennessee	1
German measles:	
Arkansas	2
Maine	1
Michigan	13
New York	63
North Dakota	1
Pennsylvania	29
Tennessee	6
Hookworm disease:	
Arkansas	6
Impetigo contagiosa:	
Tennessee	18
Jaundice, infectious:	
Michigan	4
Leprosy:	
Pennsylvania	1
Mumps:	
Arkansas	16
Colorado	9
Maine	19
North Dakota	7
Pennsylvania	219
South Dakota	14
Tennessee	5
Vermont	43
Ophthalmia neonatorum:	
Arkansas	1
New York	10
Pennsylvania	8
Psittacosis:	
Colorado	1
Puerperal septicemia:	
Arkansas	1
Tennessee	2
Rabies in animals:	
Arkansas	15
Michigan	1
New York [1]	6
Vermont	4
Rabies in man:	
Michigan	2
Pennsylvania	1
Rocky Mountain spotted fever:	
New York	2
Pennsylvania	4
Tennessee	6
Septic sore throat:	
Arkansas	35
Colorado	2
Maine	7
Michigan	36
New York	94
Tennessee	9
Tetanus:	
Arkansas	3
Michigan	4
New York	5
North Dakota	1
Tennessee	3
Trachoma:	
Arkansas	10
North Dakota	1
Tennessee	1
Trichinosis:	
Arkansas	1
Maine	1
Michigan	1
New York	10
Tularaemia:	
Arkansas	11
North Dakota	1
Tennessee	4
Typhus fever:	
Arkansas	1
New York	5
Tennessee	2
Undulant fever:	
Arkansas	6
Colorado	1
Maine	1
Michigan	10
New York	19
Pennsylvania	14
South Dakota	1
Tennessee	2
Vermont	4
Vincent's infection:	
Maine	3
Michigan	18
New York [1]	55
North Dakota	8
Tennessee	4
Whooping cough:	
Arkansas	48
Colorado	74
Maine	97
Michigan	900
New York	1,681
North Dakota	67
Pennsylvania	1,850
South Dakota	31
Tennessee	171
Vermont	199

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 9, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	106	45	12	138	291	305	8	334	85	1,131	--------
Current week [1]	66	34	8	89	214	228	1	329	46	858	--------
Maine:											
Portland	0	------	0	1	1	1	0	0	0	4	17
New Hampshire:											
Concord	0	------	0	1	0	0	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	10
Massachusetts:											
Boston	0	------	0	2	0	5	0	9	0	19	166
Fall River	0	------	0	0	0	0	0	0	0	2	21
Springfield	0	------	0	0	0	0	0	1	0	5	25
Worcester	0	------	0	0	6	2	0	1	1	17	49
Rhode Island:											
Pawtucket	0	------	0	0	1	0	0	0	0	0	1
Providence	1	1	0	4	3	2	0	2	0	30	56
Connecticut:									4		
Bridgeport	1	------	0	3	0	0	0	1	0	0	23
Hartford	0	------	0	0	0	0	0	0	0	24	38
New Haven	0	------	0	1	0	0	0	0	0	5	32
New York:											
Buffalo	0	------	0	1	0	0	0	3	0	6	87
New York	13	1	1	11	32	13	0	64	9	75	1,128
Rochester	0	------	0	0	1	0	0	1	0	6	62
Syracuse	0	------	0	0	0	3	0	1	0	21	29
New Jersey:											
Camden	0	------	0	0	0	3	0	3	0	1	24
Newark	0	2	0	2	4	1	0	4	0	34	67
Trenton	0	------	0	1	1	0	0	2	0	1	26
Pennsylvania:											
Philadelphia	2	1	0	5	8	11	0	19	1	80	391
Pittsburgh	0	2	1	0	6	8	0	10	1	21	146
Reading	0	------	0	0	0	0	0	3	0	0	40
Scranton	0	------	--------	0	-------	0	0	-------	0	1	--------
Ohio:											
Cincinnati	4	1	0	0	4	5	0	7	1	1	90
Cleveland	0	------	0	2	7	7	0	13	3	50	176
Columbus	0	1	1	1	3	2	0	4	0	5	78
Toledo	0	------	0	2	4	5	0	1	3	14	66
Indiana:											
Anderson	0	------	0	0	0	0	0	1	0	8	11
Fort Wayne	0	------	0	0	1	1	0	1	0	0	36
Indianapolis	2	------	0	0	3	7	0	4	0	23	106
Muncie	0	------	0	0	1	0	0	0	0	0	8
South Bend	0	------	0	1	3	0	0	0	0	0	21
Terre Haute	0	------	0	0	1	0	0	0	0	0	20
Illinois:											
Alton	0	------	0	0	0	0	0	1	0	2	13
Chicago	1	1	1	6	17	25	0	35	4	86	630
Elgin	0	------	0	0	1	3	0	0	0	2	6
Moline	0	------	0	0	0	1	0	0	0	2	9
Springfield	0	------	0	0	3	0	0	0	1	13	26
Michigan:											
Detroit	2	------	0	4	11	21	0	16	1	53	220
Flint	1	------	0	0	4	2	0	0	0	10	29
Grand Rapids	0	------	0	0	0	1	0	1	1	4	24
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	4	12
Madison	0	------	0	1	2	0	0	0	0	6	18
Milwaukee	0	------	0	2	1	9	0	1	0	20	87
Racine	0	------	0	1	0	0	0	0	0	2	13
Superior	0	------	0	0	1	0	0	0	0	0	10
Minnesota:											
Duluth	0	------	0	2	1	0	0	0	0	2	11
Minneapolis	0	------	0	1	5	8	0	1	0	9	89
St. Paul	1	------	0	0	2	4	0	2	0	45	49

[1] Figures for Fargo, Cumberland, Savannah, Shreveport, and Galveston, estimated, reports not received.

City reports for week ended Sept. 9, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0			0		1	0		0	2	
Davenport	0			0		1	1		0	1	
Des Moines	0		0	0	0	0	0	0	0	0	25
Sioux City	0			1		2	0		0	1	
Waterloo	2			0		0	0		0	0	
Missouri:											
Kansas City	0		0	1	5	6	0	5	4	0	98
St. Joseph	0		0	0	1	1	0	0	0	1	28
St. Louis	2		0	1	3	7	0	6	2	16	184
North Dakota:											
Fargo											
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	0	0	0	0	0	8
South Dakota:											
Aberdeen	0			0		0	1		0	0	
Nebraska:											
Lincoln	0			1		0	0		0	1	
Omaha	0		0	0	1	1	0	0	0	2	36
Kansas:											
Lawrence	0		0	0	1	1	0	0	0	0	3
Topeka	0		0	0	0	1	0	0	1	1	18
Wichita	1		0	2	1	0	0	0	0	3	24
Delaware:											
Wilmington	0		0	1	3	0	0	0	0	2	20
Maryland:											
Baltimore	0		0	0	9	7	0	6	2	33	148
Cumberland											
Frederick	0		0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	1		0	1	5	4	0	8	1	11	164
Virginia:											
Lynchburg	2		0	0	1	0	0	0	1	17	9
Norfolk	1		0	1	0	0	0	1	0	0	19
Richmond	1		0	0	1	3	0	5	0	1	55
Roanoke	1		0	0	0	1	0	0	1	0	10
West Virginia:											
Charleston	0		0	0	1	0	0	0	0	0	26
Huntington	0			0		0	0		1	0	
Wheeling	0		0	0	1	1	0	0	0	0	15
North Carolina:											
Gastonia	1			0		1	0		0	0	
Raleigh	4		0	0	0	1	0	0	0	0	3
Wilmington	0		0	0	1	1	0	0	0	0	9
Winston-Salem	0		0	0	1	0	0	1	0	0	16
South Carolina:											
Charleston	0	7	0	0	0	0	0	1	1	0	17
Florence	0		0	0	1	0	0	0	0	0	10
Greenville	0		0	0	2	0	0	0	0	0	10
Georgia:											
Atlanta	3	1	0	0	6	0	0	6	0	0	82
Brunswick	0		0	0	0	1	0	1	0	0	3
Savannah											
Florida:											
Miami	1	3	0	1	2	1	0	1	0	1	28
Tampa	0		0	2	0	2	0	1	1	0	25
Kentucky:											
Ashland	0		0	0	0	0	0	0	2	0	5
Covington	0		0	1	1	0	0	1	0	1	8
Lexington	0		0	0	0	1	0	1	2	1	16
Louisville	2		0	0	1	1	0	1	0	11	39
Tennessee:											
Knoxville	1	1	0	0	0	3	0	2	0	0	23
Memphis	1		0	1	0	4	0	3	0	9	61
Nashville	0		0	1	2	2	0	3	0	4	50
Alabama:											
Birmingham	1	1	0	0	3	1	0	4	0	3	81
Mobile	1		1	0	2	1	0	1	0	0	29
Montgomery	0	1		0		2	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		1	0	
Little Rock	0	2	0	0	3	0	0	1	0	0	4
Louisiana:											
Lake Charles	0		0	0	0	0	0	0	0	0	12
New Orleans	2	2	1	0	2	4	0	16	1	0	138
Shreveport											

City reports for week ended Sept. 9, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	0		0	0	4	0	0	2	2	0	47
Tulsa	0			1		1	0		1	0	
Texas:											
Dallas	5	1	1	6	1	2	0	2	0	1	69
Fort Worth	0		0	0	5	0	0	3	2	0	
Galveston											
Houston	2		0	0	3	2	0	5	2	5	73
San Antonio	3		0	0	4	0	0	7	1	3	79
Montana:											
Billings	0		0	0	0	0	0	0	0	2	7
Great Falls	0		0	0	3	0	0	0	0	0	17
Helena	0		0	0	0	1	0	0	0	0	2
Missoula	0		0	0	1	1	0	0	0	0	8
Idaho:											
Boise	0		0	0	1	0	0	1	0	0	4
Colorado:											
Colorado Springs	0		0	0	0	1	0	0	0	0	11
Denver	1		0	3	0	2	0	7	0	12	84
Pueblo	0		0	0	1	0	0	0	0	0	10
New Mexico:											
Albuquerque	0		0	0	1	1	0	4	0	0	18
Utah:											
Salt Lake City	0		0	2	0	3	0	1	1	30	24
Washington:											
Seattle	0		0	4	3	2	0	4	0	10	80
Spokane	0		0	1	1	3	0	1	0	0	24
Tacoma	0		0	2	0	0	0	0	0	0	81
Oregon:											
Portland	0		0	0	0	1	0	0	0	5	53
Salem	0			0		0	0		0	0	
California:											
Los Angeles	6	4	0	5	6	18	0	15	2	9	283
Sacramento	0		0	1	1	0	1	1	0	1	23
San Francisco	1	2	1	2	1	2	0	5	0	0	159

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Wisconsin:			
Boston	0	0	2	Milwaukee	0	0	5
New York:				Minnesota:			
Buffalo	0	0	40	Minneapolis	0	0	16
New York	1	2	16	St. Paul	0	0	4
Rochester	0	0	4	Iowa:			
Syracuse	1	1	0	Davenport	0	0	1
New Jersey:				Maryland:			
Camden	0	0	11	Baltimore	0	0	1
Pennsylvania:				District of Columbia:			
Philadelphia	0	0	25	Washington	1	1	8
Pittsburgh	0	0	8	South Carolina:			
Scranton	2	0	0	Charleston	0	0	8
Ohio:				Texas:			
Cleveland	0	0	4	San Antonio	0	0	2
Toledo	1	1	1	Colorado:			
Illinois:				Pueblo	0	0	4
Chicago	0	0	6	California:			
Michigan:				Los Angeles	0	0	6
Detroit	0	0	34	Sacramento	0	0	1
Grand Rapids	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Pittsburgh, 1; Toledo, 1; Alton, Ill., 1.

Pellagra.—Cases: Montgomery, 2.

Typhus fever.—Cases: New York, 1; Charleston, S. C., 4; Miami, 2; Birmingham, 1; Montgomery, 4; Lake Charles, 1; New Orleans, 5; Dallas, 5; Los Angeles, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended August 19 and 26, 1939.—During the weeks ended August 19 and 26, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended Aug. 19, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	6					8
Chickenpox		4	2	8	52	7		5	9	87
Diphtheria				32	2					34
Dysentery					4					4
Influenza		7			13				1	21
Lethargic encephalitis					1					1
Measles		2		44	82	6	6	4	4	148
Mumps		1		3	7	3			2	16
Pneumonia		1			18				1	20
Poliomyelitis		3			5	3				11
Scarlet fever		7	1	26	47	7	1	5	3	97
Trachoma					1					1
Tuberculosis	3	4	28	66	60	4		5		170
Typhoid and paratyphoid fever		1		11	6	2	3	1		24
Whooping cough		2	3	52	61	7	15	11	30	181

Week ended Aug. 26, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1			1			2
Chickenpox			2	22	30	1	11	2	17	85
Diphtheria		2	3	39	1	5	3			53
Dysentery				1	1				7	9
Influenza					5				1	6
Measles		2		45	62	7	3		2	121
Mumps				2	6	3			2	13
Pneumonia		2			9				2	13
Poliomyelitis			1	5	7	1			1	15
Scarlet fever		2	2	18	45	7	1	7	6	88
Trachoma					1				1	2
Tuberculosis	2	3	16	68	48	5	1	2		145
Typhoid and paratyphoid fever		1	3	29	8			3		44
Whooping cough		6		48	65	16	10	9	11	165

CUBA

Provinces—Notifiable diseases—4 weeks ended August 19, 1939.—During the 4 weeks ended August 19, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2	1	12		5	20
Chickenpox						1	1
Diphtheria	2	15	1	4			22
Leprosy		1		2	2	1	6
Malaria	17	1		25	1	17	61
Measles				1		5	6
Poliomyelitis	1	14					15
Scarlet fever			2			6	8
Tuberculosis	24	21	25	67	6	37	180
Typhoid fever	37	76	21	58	19	40	251
Undulant fever			1				1

JAMAICA

Communicable diseases—4 weeks ended September 2, 1939.—During the 4 weeks ended September 2, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	5	13	Leprosy		2
Diphtheria	4	5	Puerperal sepsis		3
Dysentery	2	4	Tuberculosis	25	87
Erysipelas	1	2	Typhoid fever	7	94

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939: 3	June 10	June 17	June 24	July 1939: 1	July 8	July 15	July 22	July 29	August 1939: 5	Aug. 12	Aug. 19	Aug. 26
Afghanistan	C														[1] 214			
	D										82				99			
Kandahar Province:																		
Greshk	C									5								
Tchakhansour	C											P						
Ceylon: Batticaloa	D										1							
China:																		
Canton	C				9													
	D				6													
Fatshan	C				P													
	D				154													
Hainan Island	C				P													
Hankow	C													P				
Honan	C				P													
Hong Kong	C				25	16	27	20	50	100	60	17	22	15	26	75	52	36
	D				19	9	13	20	38	62	38	11	19	6	20	54	33	18
Macao	C			1	20	9	20	30		95	103	59	81	65	20	17	17	
	D				12	6	11	16		68	58	32	30		9	7	6	
Shanghai	C						1						2			1	[2] 2	
Whampoa	C				P													
India	C	4,915	6,667	11,896	7,117	1,525	1,509	1,624	1,990	2,361	2,764							
	D	2,567	3,013	5,502	3,337	641	655	738	843	1,084	1,152							
Akyab	C				1	1					[2] 1							
Allahabad	C		[2] 1		1				[2] 1				7	17		12	15	
Assam	C	113	238	220	405	115	105	58	43	43	29		9	4	9			
	D	67	98	105	156	39	41	23	14	22	7		1	2	2			
Bassein	C		1	2	6	3	1	[2] 1										
Bengal Presidency	C	3,157	4,941	8,754	3,193	550	466	430	594	703	820	632	818	759	593	578		
	D	1,606	2,297	4,174	1,504	248	199	198	229	325	375	119	400	359	324	359		
Bihar Province	C				584	263												
	D				264	107												

Bombay Presidency	C	205	98	157	196	35	27	10	26	72	177	318	294					
	D	87	34	61	83	16	12	5	4	33	51	128	120					
Burma	C												10	13				7
	D												5	6				7
Calcutta	C	118	315	963	821	99	140	111	243	206	169	123	88	50	27	36	21	
Cawnpore	C		3	3	4	3	2	1	4	1	3		1		6	18	29	
	D		1		2		1	1	2	1	2		1		2	3	11	
Central Provinces and Berar	C	61	71	184	194	7	11	7	9		7	16	22	34	49	86	203	
Chittagong	C		2	12	9	1	1		[2] 1	[2] 2	3	1	2	5	1	2	2	
Delhi	C												1			2		
	D			1												2		
Howrah	C	255	482	785	420		99	55	103	98	90	92						
Madras Presidency	C	997	201	84	60	16	14	25	11	19	53	28	20					
	D	496	93	30	24	5	4	2	2	7	26	9	6					
Madras	C	3	2					1										
	D	2																
Orissa Province	C	73	56	161	111	25	40	64	44	99	127	168	165	160	150	106	283	
Punjab	C														1			
Rangoon	C			4	9	2		[2] 1	1									
Tirumalaivasal	C	5																
India (French):																		
Chandernagor Territory	C	1	16	22														
Karikal Territory	C	41																
Pondichery Province	C			1														
Tonkin Province	C												1					
Iran:																		
Khorassan	C											79	246	46	30			
Zabol	C									10		22	2					
Iraq: **Basra**	C																	[2] 1
Thailand:																		
Bangkok	C			4	1													
Smud Prakar Province	C		5	13														
On vessels:																		
S. S. *Erinpura* at Rangoon from Calcutta	C				1													
S. S. *Amra* at Calcutta from Rangoon	C						1											
S. S. *Tin How* at Singapore from Hong Kong	C										1							
S. S. *Essi* at Hong Kong from Calcutta	C											1						

[1] For 2 weeks. [2] Imported. [3] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939				July 1939					August 1939			
						3	10	17	24	1	8	15	22	29	5	12	19	26
Algeria: Algiers	C		1															
Argentina (see also table below)	C											1		1				
	D											1		1				
Belgian Congo	C		3		18								1		1			
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa:																		
Kenya	C	3																
Nyasaland	C												P	2				
Uganda	C	30	24	17	17	5	12		8	15	17	11	14	4	4			
	D	29	24	17	17	5	12		8	15	17	10	10	3	3			
China: Manchuria.[3]																		
Dutch East Indies:																		
Java—																		
Batavia	C																[5] 1	
Batavia Residency.[4]																		
Java and Madura	C	259	236	167	94	14	14	9										
	D	256	232	165	94	14	14	9										
Ecuador:																		
Chimborazo Province	C		6	[6] 18														
Riobamba	C	[6] 16																
	D	15																
Guayaquil	C		1	2														
	D			2														
Plague-infected rats		1	3															
Loja	C	[7] 4																
Pueblo Viejo	C	3																
Egypt: Asyut Province	C	[8] 32	22	35	10	2												
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector					1													
Honokaa				1														
Kapulena				2				1										
Kukaiau		1	3															
Paauhau Sector		1	5							1								
Paauilo									1									

India	C	3,443	5,718	10,527	770	18	9	14	31	2	27							
	D	1,391	2,636	3,118	524	12	1	7	15	3	15							
Allahabad	D	[3] 1																
Bassein	C		3				1				2				1			
Plague-infected rats			1															2
Bihar Province	C				12													
	D				9													
Bombay Presidency	C	27	33	46	11	3	2		1		5	3	5					
	D	13	20	23	8	1	1			1			2					
Burma	C												30	14				21
	D												23	13				19
Calcutta	C			1														
Calicut	C				1													
Central Provinces and Berar	C	1,414	2,056	1,914	198	3			3	3				4	10	31	31	
Cochin: Plague-infected rats		1																
Coorg Province	C			4	1			1		2								
Delhi	C												1					
Madras Presidency	C	164	28	15	14	2		7	5		2	2						
	D	64	19	8	8	1		2	3		2							
Rangoon	C	1							1									1
	D								1									1
Indochina (see also table below):																		
Cambodia	C						1											
Pnom Penh	C			1														
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Thailand:																		
Bichitr Province	C				4													
	D				1													
Bisnulok Province	C	33	1															
	D	5																
Lampang Province	C	1																
Prae	C			3														
Svargalok Province	C	17	2															
Tak Province	C	3																
Tunisia: Tunis	C			1														
Plague-infected rats		3																

[1] Including plague in the United States and its possessions.
[2] Information dated May 5, 1939, stated that 34 cases of plague with 8 deaths had occurred in Hsinking, Manchuria, China, since the beginning of the year.
[3] Imported.
[4] A report dated July 10, 1939, states that up to July 6, 84 deaths from pneumonic plague had occurred in Batavia Residency, Java, Dutch East Indies.
[5] Includes 11 cases of pneumonic plague.
[6] Pneumonic plague.
[7] Unofficially reported.
[8] Includes 4 cases of pneumonic plague.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939 3	10	17	24	July 1939 1	8	15	22	29	August 1939 5	12	19	26
Union of South Africa	C	18	22	9														
Cape Province	C	7	4	4	1													
Orange Free State	C	4	6	7														
Transvaal	C		7															
United States.[7]																		

Place		February 1939	March 1939	April 1939	May 1939	June 1939	July 1939
Argentina (see also table above):							
Mendoza Province	C						1
San Luis Province	C						1
Bolivia	C		[6] 1				
Brazil:							
Alagoas State	C	5	11	1			
Bahia State	C		1				
Pernambuco State	C	3	5	6			
Sao Paulo State	C			1			

Place		February 1939	March 1939	April 1939	May 1939	June 1939	July 1939
Indochina: Cambodia	C	2					
Madagascar (central region)	C	77	52	33	16	12	14
	D	67	21	25	14	12	13
Peru	C	9	12	11	11	3	7
Cajamarca Department	C		3				
Lambayeque Department	C		1	1	1		
Libertad Department	C	4	1	2	3	1	
Lima Department	C	4	2	1		1	7
Piura Department	C	1	5	7	7	1	

[6] Pneumonic plague.

[7] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1939: *California*—Ground squirrels, March and April; insects, March and June; *Idaho*—Insects, June 14; *Montana*—Ground squirrels, July 15; insects, July 15 and 17; *Nevada*—Insects, April; *New Mexico*—Kangaroo rat, Apr. 15; *Oregon*—Ground squirrels, June; insects, May and June; *Washington*—Rabbit, May; insects, April and May; *Wyoming*—Insects, July 3.

SMALLPOX

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939 3	June 10	June 17	June 24	July 1939 1	July 8	July 15	July 22	July 29	August 1939 5	Aug. 12	Aug. 19	Aug. 26
Algeria: Oran Department	C			1	2				1					2				
Arabia: Aden	D	1																
Argentina. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
British East Africa:																		
Nairobi	C						26											
Tanganyika	C	17	96	146	9	17	26	5		1	13	4		1	4			
Canada:																		
Alberta	C	37	7						22									
British Columbia	C	4	8															
Manitoba	C	1	22	13	2				1									
Ontario	C	1																
Saskatchewan	C	10	2					1		1								
Canary Islands: Las Palmas	C		3															
Ceylon: Maskeliya	C		1															
China (see also table below):																		
Dairen	C		2	4	5	1	1			2								
Foochow	C		2	8	12	5		3										
Hong Kong	C	45	45	34	11	1				1				1				
	D	23	49	26	11	1				1								
Macao	C	3																
Shanghai	C	274	102	50	18	2	2	1	3	2	1					1		
Swatow	C	3	2	7														
Tientsin	C	1		4	1		1											
Chosen (Korea). (See table below.)																		
Colombia (see also table below): Cartagena	D	1	2	1									1					
Dahomey. (See table below.)																		
Dominican Republic	C														1			
Ecuador: Guayaquil	C		4	1					3	1								
	D		1	1					1									
Eritrea: Massaua	C							1				1						
France. (See table below.)																		
French Equatorial Africa:																		
Brazzaville	C															31		
Chad	C			14														
Gold Coast	C									9								
Accra	C									1								
Greece. (See table below.)																		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939 3	June 10	June 17	June 24	July 1939 1	July 8	July 15	July 22	July 29	August 1939 5	Aug. 12	Aug. 19	Aug. 26
Guatemala. (See table below.)																		
Guinea (French)	C										40							
India	C	11,353	15,237	18,580	17,603	3,654	2,972	2,738	2,135	2,110	1,940							
	D	2,536	3,254	4,895	4,051	1,032	700	600	677	502	533							
Allahabad	C		2		1					1								
Assam	C	58	121	225	252	24	36	35	32	20	7	19	11	15	12	22		
Bengal Presidency	C	1,735	2,152	3,305	1,626	230	202	184	165	164	148	119	130	108	49	77		
	D	632	724	1,242	605	87	78	60	70	52	60	37	50	41	21	28		
Bihar Province	C				2,360	672												
Bombay Presidency	C	1,514	3,936	6,398	4,061	806	755	642	606	527	313	443	336					
	D	220	558	961	598	118	109	82	106	115	65	92	84					
Bombay	C	20	56	61	41	9	12	9	10	15	16	5	4	10	9	8	6	
	D	11	21	20	17	7	5	6	3	9	8	5	4	6	8	4	3	
Burma	C									1	1		2	4				9
	D												1	2				3
Calcutta	C	776	806	910	298	34	40	22	31	33	32	26	12	9	12	3	5	
	D	451	548	676	235	25	31	17	22	19	20	23	7	8	10	1	5	
Cawnpore	C	2	5	14	16	1		2										
Central Provinces and Berar	C	198	540	1,132	904	265	154	174	164	119	116	62	38	32	52	47		
Chittagong	C	1																
Cochin	C	4		3					1									
Delhi	C	113	133	187	203	39	23	15	22	10	7	5	7	5	7	2	3	
Howrah	C	118	152	222	103	19	17	20	31	17	30	13						
Jodhpur	D				38		3	3	1		4	1	6	3			2	
Karachi	C	3	3	3	8	1						1	1	4	2	1	3	
Madras Presidency	C	1,389	1,400	1,020	545	110	97	128	130	114	125	175	55					
	D	233	234	241	155	29	22	16	35	21	25	35	8					
Madras	C	304	236	193	32	5	5		2	3	1	4	3	2	1	4	5	
Negapatam	C														1			
Northwest Frontier Province	C	113	114	110	86	62	37	54	12	22	15	30	19	9	7	3	1	
Orissa Province	C	465	699	1,039	722	84	117	89	86	60	111	75	95	50	52	68	231	
Punjab	C	329	190	191	214	97	72	45		48	24	8						
Rangoon	C	5	14	10	14	6	2	2		1			1	2	2			9
Sind State	C	299	279	251	209		44	64	23	53	21	59	20	20	13	16	51	
Vizagapatam	C			6														

India (French):																		
Chandernagor Territory	C	2		4	3						1		1					
Pondichery Territory	C	6	7	3							6		2					
	D	4	3	2							1		2					
Indochina (French) (see also table below):																		
Tonkin Province	C	183	211	228	135	20	20	14		1		1						
Haiphong	C	2																
Hanoi	C	10	6	13	22		3											
Saigon-Cholon	C	3																
Iran	C		11	10	3		1		2									
Teheran	D													6				
Iraq	C	1		6		2		2	2									
Baghdad	C				[1] 1													
Ivory Coast. (See table below.)																		
Japan:																		
Kobe	C	66	16															
Kyoto	C	1																
Nagoya	C		1											1				
Osaka	C	1	1	1	5		1											
Taiwan.[2]																		
Tokyo	C	5		1														
Mexico (see also table below):																		
Mexico, D. F.	C	3	6	3	3	2	1	2		1		2						
Monterrey	C	2	1	1												1		
Piedras Negras	D		1															
San Luis Potosi	D	5	3	1	1			3	1		1							
Tampico	C	7	22	1													1	
Morocco. (See table below.)																		
Mozambique	C		11	11	32	1				1								
Nigeria	C	984	884	1, 261	514	16	22	21	17	25	21	34	16	20				
Calabar	C	6	5	3	44						1							
Lagos	C		1		4													
Port Harcourt	C	1	1					[1] 1										
Niger Territory. (See table below.)																		
Portugal (see also table below):																		
Lisbon	C	21	21	34	33	17	13	9	14	6	7	10	3	6	3	15	11	
Oporto	C	14	2	2	8	1	2	5	2	4			5	3			1	
Portuguese Guinea. (See table below.)																		
Salvador. (See table below.)																		
Senegal. (See table below.)																		
Sierra Leone	C	9	2	8	20													
Society Islands: Tahiti	C										[3] 12							
Southern Rhodesia	C	48		21	11			3										
Spain (see also table below):																		
Barcelona	C										[1] 1	4						
Malaga	D									2		2	1					
Valencia	C							1							4	3		

[1] Imported.
[2] Information dated Apr. 6, 1939, states that up to Mar. 31, 61 cases of smallpox were reported in Taiwan, Japan.
[3] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Jan 29–Feb 25, 1939	Feb 26–Mar 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939: 3	10	17	24	July 1939: 1	8	15	22	29	August 1939: 5	12	19	26
Straits Settlements: Singapore	C		1															
Sudan (Anglo-Egyptian)	C	18	17	90	12	7	1	5	2	1		1	21		5	74	11	16
Syria: Aleppo	C		1															
Thailand	C		2	2		1				2	1							
Bangkok	C											1						
Nan Province	C												24					
Turkey. (See table below.)																		
Union of South Africa. (See table below.)																		
Uruguay	C		1															
Venezuela. (See table below.)																		

On vessels:

S. S. *Maihar* at Aden from Calcutta	1 case	Jan. 30, 1939
S. S. *Alavi* at Aden from Bombay	1 case	Feb. 2, 1939
S. S. *Orange Moor* at Saigon from Shanghai	1 case	Do
S. S. *Queen Victoria* at Victoria from Shanghai	1 death	Feb 6, 1939
S. S. *Rugelsey* at Williamshead from Shanghai	10 cases	Feb. 19, 1939
Pilgrim ship *Tantalus* at Penang from Jeddah	1 case	Feb. 27, 1939
Pilgrim ship *Ajax* at Penang from Jeddah	1 case	Mar. 2, 1939
S. S. *Gneisenan* at Genoa	1 case	Mar. 5, 1939

On vessels—Continued.

S S *Riley* at Freemantle from Shanghai	1 case	Do.
S S *Mau Sang* at Sandakan from Hong Kong	1 case	Apr. 6, 1939
S S. *Thisteleglen* at Singapore	1 case	Apr. 10, 1939
S. S *Empress of Russia* at Hong Kong from Shanghai	2 cases	Apr. 20, 1939
S S. *Liebenfels* at Rangoon from Moulmein	1 case	June 2, 1939
S S. *City of Pittsburgh*. Manila, P. I	1 case	June 28, 1939
S S *Atalaya* at New Orleans	1 case	July 25, 1939
S. S *Saturnia* at Jamaica, N. Y., from Lisbon	1 case	Aug. 3, 1939

Place		February 1939	March 1939	April 1939	May 1939	June 1939	July 1939
Argentina	C	3					
Belgian Congo	C	26			169	199	
Bolivia:							
Cochabamba Department	C		8	1		9	
La Paz Department	C		8	4	4	1	
Oruro Department	C		1	2		4	
Potosi Department	C		1				
Santa Cruz Department	C		6		2		
China: Harbin	C	1	5	5	1	1	
Chosen (Korea)	C		42				
Colombia (see also table above)	C		[1] 548	491	437	375	
Dahomey	C		4				8
Ecuador: Guayaquil and vicinity	C					5	
France	C	3					
Greece	C	1	38	7	11		
Guatemala	C	5		4			
Indochina (French) (see also table above)	C	163	515	606	671	178	103
	D	21	79	52	109	31	21
Ivory Coast	C	59	17				
Mexico (see also table above):							
Aguascalientes State	D					[2] 3	
Aguascalientes	C	[3] 15	3				
Chihuahua State	D					[2] 5	
Chihuahua	C	[3] 1					
Coahuila State	D					[2] 2	
Guanajuato State	D					[2] 246	
Guerrero State	D					[2] 3	
Hidalgo State	C	[3] 29	7				
	D	[3] 3	1			[2] 13	
Jalisco State	D					[2] 4	
Guadalajara	C	[3] 1					
Mexico, D. F.	C	[3] 7	9				
	D	[3] 5		3		5	
Mexico (see also table above)—Con.							
Mexico State	D					[2] 146	
Michoacan State	D					[2] 137	
Morelos State	D					[2] 9	
Nayarit State	D					[2] 2	
Nuevo Leon State	D					[2] 1	
Monterrey	C		3				
Oaxaca State	D					[2] 1	
Puebla State	D					[2] 20	
Queretaro State	C	[3] 1					
	D	[3] 1				[2] 34	
San Luis Potosi State	D					[2] 22	
San Luis Potosi	C	[3] 16	11			8	
	D	7	3			5	
Sinaloa State	D					[2] 7	
Sonora State Guaymas	C		1				
Tamaulipas State	C	[3] 11					
Tampico	C	[3] 9	15				
	D	1	2				
Zacatecas State	D					[2] 27	
Morocco	C		1		6		
Niger Territory	C	34	40	9		3	
Portugal (see also table above)	C		112	108			
	D		11	9			
Portuguese Guinea	C			115		7	
	D			8			
Salvador	C		1				
Senegal	C	35	66	42	55	25	24
Spain (see also table above)	C				49		
Turkey	C	8		59	34		
Union of South Africa: Transvaal	C					81	
Venezuela	D	8	6	3	7	6	
Caracas	C						1

[1] For February and March.
[2] For May and June.
[3] For January and February.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Week ended— May 1939 6	13	20	27	June 1939 3	10	17	24	July 1939 1	8	15	22	29	August 1939 5	12	19	26
Algeria:																					
Algiers Department	C	14	29	21		11		15	12	28	25	9	18			21	6	7			
Algiers	C		16	5		10		12	7		7		2			4					
Constantine Department	C	90	164	195	69	13		106	43	43	56	56	33			78	13	11			
Bone	C		2	9	1											1					
Constantine	C	8	7	39	10	8		34	3		31		6			51	6	6			
Philippeville	C	1	14	2	2			7	4		1	1				1					
Oran Department	C	29	29	31	6	2		20	7	5	21	6	7			1	2	4			
Southern Territories	C	7	21	13		36		26	17		4										
Australia:																					
Brisbane	C		1									1	1								
Queensland	C	5		5		1									4						
Bolivia. (See table below.)																					
British East Africa: Kenya	C	1		1																	
Bulgaria. (See table below.)																					
Chile	C	63	43	28	6	12	16	15	23	36											
Antofagasta Province	C	1		2	3		1	1	2	1											
Bio Bio Province	C	4	5	2																	
Cautin Province	C	2	1																		
Coquimbo Province	C	12	2																		
Curico Province	C	1						1													
Nuble Province	C	1	4	7																	
Santiago Province	C	40	25	14	1	11	15	12	15	33											
Valdivia Province	C	1		1	1				4												
Valparaiso	C	1		1		1								1		1	3	1		1	
China (see also table below):																					
Dairen	C						1	1								2		3	2		
Hankow	C						1				1										
Shanghai	C				2							12	7	14	8	10	10	9			
Tientsin	C			3		1															
Chosen (Korea). (See table below.)																					
Egypt:																					
Alexandria	C		3	13	5	8	3	10	9	3				1	2		1		1		1
Asyut Province	C	4		14	8	2	1	4	3		2				1			1			
Beheira Province	C	24	44	109	20	10	8	26	7	6	3	5	8	7	15	1	2	9	2		

Beni Suef	C							1									1	1			
Cairo	C	18	31	37	2	1	2	4	2			3				1					2
Dakahliya Province	C	11	106	178	49	44	48	55	54	37	31	19	31	23	11	10	2	4	8		
Faiyum Province	C			7																	
Gharbiya Province	C	51	245	355	50	34	76	56	45	39	15	13	18	26	48	30	8	4	3		
Girga Province	C	58	47	42	3	4	7	17	18	7		1	3	1	1	1	1	2			
Giza Province	C	19	16	53	9		9	4	8	11	6	3									
Kalyubiya Province	C	33	84	44	6	8	10	21	16	5	3	2						4	1		
Minufiya Province	C	67	101	96	40	45	19	37	21	12	20	12	12	27	11	5	3	6	3		
Port Said	C																		3		
Qena Province	C		47	127	6	4	1	10	2	4								1			
Sharkiya Province	C	17	46	66	4	5		15	11	5	4	4	3	2	1	3	1	2			
Provinces	C	323	748	1,110	195	200	186	247	185	126	90	59	75	92	92	53	18	38	21	18	10
Eritrea: Hamasien	C		4								5										
Guatemala. (See table below.)																					
Hawaii Territory: Honolulu	C	1	1		1						1					1	2		1		1
Hungary	C		5	9										1							
India: Coorg Province	C		5	3						3											
Iran	C	1		1	2	9		7	3		2	8									
Tabriz	C		1						6	4					4			1			
Iraq	C	2											2	1		1	1				
Arbil Province	C							1	2		1	1						4			
Baghdad	C		1	3	1	1						1	2	1		1	1	1			2
Kirkuk Province	C	1						7													
Irish Free State: Louth County—Drogheda	C												5								
Latvia. (See table below.)																					
Lithuania. (See table below.)																					
Mexico (see also table below):																					
Mexico, D. F	C	4	2	5			5	8	7	7	7		4	9	7	6					
Monterrey	C							1				3			3		2			1	
Saltillo	C									1											
San Luis Potosi	D			1	1																
Torreon	D	1		2	1											4					
Morocco	C	152	177	193	45	36	42	22	28	30	29		10	5	6			3			
Casablanca	C	6		12					1				1								
Nigeria: Kano Province	C																[1]1				
Palestine:																					
Haifa	C	1		2		2	1	1			3		1		1		1			1	2
Jaffa	C		1	1				2			3		5		1		1	1			5
Panama Canal Zone. (See table below.)																					
Peru. (See table below.)																					
Poland	C	463	580	786	109	99	104	125	97	81	71	78	60	46	23	23	16	24			
	D	20	23	34	6	5		1	3	6	2	2	2	2	1	1		1			
Portugal: Oporto	C			3																	
Portuguese East Africa: Laurenco Marques	C		2																		

[1] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths, P, present]

Place		Jan. 29–Feb. 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Week ended—																
					May 1939				June 1939				July 1939					August 1939			
					6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26
Rumania. (See table below.)																					
Spain. (See table below.)																					
Straits Settlements: Singapore	C	5	1	1																	
Sumatra: Medan	D	1																			
Syria:																					
Aleppo	C	2																			
Beirut	C		1																		
Lebanese Republic	C			2																	
Trans-Jordan	C			8	5	1	3			1			1								
Tunisia:																					
Tunis	C	33	64	89	6	13	16	4	1	13	2	2	5	9	1	14	1	1	2		
Provinces	C	506	694	1,073	264	248	271	223	202	228	316	221	333	202	181	158	124	109	52		
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Venezuela. (See table below.)																					
Yugoslavia	C	38	49	115	13	25	19	5	10	3	17	5		5	17	2	2	1			
On vessels:																					
S. S. *Stanbrook* at Mers el Kebir	C			1																	
S. S. *Normandie* at Plymouth	C												1								

Place		February 1939	March 1939	April 1939	May 1939	June 1939	July 1939
Bolivia:							
Cochabamba Department	C		1				
La Paz Department	C			10	11	7	
Oruro Department	C			1	1		
Potosi Department	C		7	11	2	4	
Santa Cruz Department	C				2		
Tarija Department	C		1				
Bulgaria	C			14			
China: Manchuria—Harbin	C		23	4	16	11	
Chosen (Korea)	C	9	106			29	
Guatemala	C	22	25	14	4	8	9
Latvia	C			1			
Lithuania	C	42	32	23	6		
Mexico (see also table above):							
Aguascalientes State	D					[2] 4	
Aguascalientes	C	[3] 11	2				
	D	[3] 8	1				
Chihuahua State	D					[2] 1	
Coahuila State	D					[2] 2	
Durango State	D					[2] 2	
Guanajuato State	D					[2] 7	
Guerrero State	D					[2] 2	
Hidalgo State	C	[3] 2	1				
	D	[3] 1				[2] 15	
Jalisco State	D					[2] 3	
Mexico, D. F.	C	[3] 14	9			27	
	D	[3] 6	3	3		11	
Mexico State	C	[3] 8					
	D	[3] 2				[2] 21	
Mexico (see also table above)—Con.							
Michoacan State	D					[2] 10	
Oaxaca State	D					[2] 22	
Puebla State	D					[2] 24	
Queretaro State	C	[3] 4					
	D	[3] 1				[2] 4	
San Luis Potosi State	D					[2] 2	
San Luis Potosi	C	[3] 8	3				
Sonora State	D					[2] 2	
Tabasco State	D					[2] 1	
Tamaulipas State	C	[3] 1					
Tlaxcala State	D					[2] 2	
Vera Cruz State	D					[2] 3	
Zacatecas State	D					[2] 17	
Panama Canal Zone	C				1	1	
Peru	C		197				
Rumania	C	121	205	28	40	75	
Spain	C			4	14	9	7
Turkey	C	46	57	62	49	35	15
Istanbul	C		4	4		3	
Union of South Africa:							
Cape Province	C	25	17	32	127		
Natal	C	3	2	35	7	7	
Orange Free State	C	1	3	4	4	4	
Transvaal	C		16	16	13	13	
Venezuela: Bolivar	C			1	3		

[2] For May and June.
[3] For January and February.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths, P, present]

Place		Jan 29–Feb 25, 1939	Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Week ended— May 1939 6	May 13	May 20	May 27	June 1939 3	June 10	June 17	June 24	July 1939 1	July 8	July 15	July 22	July 29	August 1939 5	Aug. 12	Aug. 19	Aug. 26
Brazil [1]																					
Amazonas State	D														[2]1						
Espirito Santo State	D	42	21	28				[2]1													
Minas Geraes State	D	8	3	2																	
Para State	D							[2]1						1							
Rio de Janeiro State	D		1																		
Cameroon—Bafia	C																	[4]1			
Colombia Antioquia Department:																					
Caracoli	D								1							1					
San Carlos	D											1				1					
French Equatorial Africa:																					
Bangui.[3]																					
Gabon	D														1						
French Guinea	C									2											
Gold Coast	C			1					1												
Ivory Coast	C	3		3	[5]3			2	1	[6]8											
	D	1																			
Nigeria	C	2	1													1					[7]1
	D	2																			
Niger Territory:																					
Konni Circle	C											3									
Tahua	C							[7]1													
Senegal																					
Bambey	C											1									
Diourbel	C											6									
Ziguinchor	C											10									
	D											5									
Sudan (French). Bandiagara	C											1									

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type
[3] During the week ended September 16, 1939, 1 fatal case of suspected yellow fever was reported in Bangui, French Equatorial Africa.
[4] Exact date not given.
[5] Includes 1 suspected case.
[6] Includes 4 suspected cases.
[7] Suspected.

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PREVALENCE OF POLIOMYELITIS

During the week ended September 30, 468 cases of poliomyelitis were reported in the United States, as compared with 484 cases during the preceding week, and a median of 277 cases for the corresponding week of the 5 years 1934–38. Decreases occurred in a number of the States which have been reporting the largest numbers of cases, while small increases occurred in several States which have been reporting very few cases. The States reporting 10 or more cases are given in the following table:

	Cases		Cases
New York	109	Minnesota	34
New York City	13	Minneapolis	15
New Jersey	17	Iowa	16
Pennsylvania	36	Texas	16
Philadelphia	19	Colorado	13
Illinois	13	New Mexico	10
Michigan	58	Utah	13
Detroit	33	California	57
		Los Angeles	14

STABILIZED METHOD OF FORECASTING POPULATION [1]

By Bernard D. Karpinos, *Assistant Statistician, United States Public Health Service*

Broadly viewed, there are two types of population estimates, from the standpoint of time. There are those estimates which deal with reconstructing the past, and there are those that are directed toward forecasting the future. The two types of estimates are quite distinct, and their underlying principles are considerably different. The first type aims at more or less accurate numerical evaluations of the actual populations, while the other basically strives to obtain the best estimates that could be expected *if* certain concatenations of factors that have been operating within the population in the past should continue to do so in the future.

[1] From the Division of Public Health Methods, National Institute of Health. Acknowledgment is made to Dr. Harold F. Dorn, Dr. Frank Lorimer, Mr. Leland O. DeVinney, Mr. M. Provus, and Miss Lolagene Convis for their valuable suggestions and criticism.

I

Estimates of the first type may be classified as precensal, intercensal, and postcensal. Precensal estimates, that is, estimates for years previous to any date for which reliable census data are available, are frequently made by backward extrapolations.[2] This is accomplished by applying a certain mathematical function to the given data and extending the function into the past. The problem of intercensal estimates has been quite satisfactorily solved on the basis of either arithmetic or geometric interpolations. The postcensal estimates are of two kinds, depending on the data at hand.

Where no records of births and deaths are available for the given period, or where such records do exist but there is no possibility of obtaining estimates on net migration, postcensal estimates are customarily made by forward extrapolations of the latest intercensal increases, again on the basis of either an arithmetic or a geometric progression. Long-time functions, as the logistic curve or any other function that is based on a longer period than two censuses, which might be profitably utilized for short-range predictions of larger populations, would hardly work in making estimates for small units of populations, such as cities, counties, and even States.

In cases where birth and death data are available, and where, in addition, there is also some possibility of obtaining fair estimates on net migration, the proper procedure, of course, is to add to the latest census the population increase based on these factors. Natural and simple in its application, this well-known method, recently called "migration and natural increase method" (*15*), presents a troublesome problem when applied to State or city data, owing to the fact that internal migration is one of the factors most difficult to determine. School statistics, frequently supplemented by data from other existing population sources, recently have been widely exploited for making such estimates of migration, but this is substantially a loosely defined procedure.[3]

II

In dealing with estimates of the second type, namely, forecasts of future populations, there are two possibilities from which to choose. One may fit a curve to the data for the past and project it into the future. This can be achieved either in the form of a free-hand graphical representation, or in terms of finding a mathematical equation to express the functional relationship of the data. In

[2] This excludes, of course, estimates for the "remote" past where such extrapolations would undoubtedly be illogical In such cases the estimates are usually based on some fragmentary evidence, and are usually conjectural in character

[3] For a detailed discussion of the methods used for postcensal estimates of population, see references (*14*) and (*15*).

either case no attempt is made to analyze the determining factors.[4] The end result is the only guide, and the main assumption is that the existent conditioning factors will remain unaltered during the period for which the forecast is made. There is certainly a rationale behind each of these curves, it being claimed that the logistic curve is the one more "in harmony with the known facts with regard to population growth and with our rational ideas on the subject" *(12)*.[5]

The second possibility in dealing with population forecasts is to start with a population of a certain point in time. Usually, the latest census with its age, sex, race, and nativity distribution of the population is taken as a point of departure. No law of population growth is sought in this case. By assigning to the selected population different birth and death rates and different net migrations, variously combined, there are gradually built up different population forecasts. The assigned birth and death rates, as well as the net migrations, are taken within reasonable limits of credibility determined by the prevalent trends. The estimates worked out by P. K. Whelpton *(16)* are of this type. This is, of course, a laborious procedure, and for this reason the number of combinations has to be limited. The building up of the populations is done essentially on the basis of survival factors.[6]

The method of population forecasting described here is of the latter type. It is adaptable mainly for long-time forecasts. It is simple and flexible in its application, and it does away with the laborious procedure involved in the previous method. It utilizes the stabilized age compositions, and it is called, accordingly, "stabilized method of forecasting populations."

Stabilized age compositions are, as is well known, hypothetical structures. They are derived on the assumption that the populations grow freely under the influence of actual or postulated fertility and mortality without being disturbed either by emigration or immigration. Once "left alone," as shown by Sharpe and Lotka *(13)*, such populations will ultimately, that is to say after a considerable time, conform to fixed age structures, and they will then grow at uniform rates. These ultimate age compositions are called stabilized age compositions, and the rates have been termed "true" rates of natural increase.

Being solely a function of the actual or assigned fertility and mortality of the population, independent of the present age structure, stabilized age compositions can readily be computed. Such age compositions were calculated for different true rates of natural increase,

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[4] The parameters of the curve are, of course, defined by these factors, but the character of the factors, and especially their interactions, are still obscure.

[5] This article by Dr. Reed is highly recommended as a clear statement of the problem See also ref *(17)*.

[6] Strictly defined, Whelpton's 5-year age period–5-year time interval survival rates *(16)* are the ratios of L_{x+5}/L_x of the life tables; in other words, they are the probabilities of persons of age x to survive to age $x+5$.

Table 1A.—*Age distributions of stabilized populations of different true rates of natural increase (r), based on the life tables for the white population of the United States, 1929–31* [1]

Age group	r= .0250	r= .0225	r= .0200	r= .0175	r= .0150	r= .0125	r= .0100	r= .0075
Under 5	15.13	14.30	13.46	12.68	11.90	11.13	10.39	9.66
5–9	13.17	12.60	12.04	11.46	10.89	10.32	9.75	9.18
10–14	11.64	11.18	10.81	10.43	10.03	9.62	9.21	8.78
15–19	10.12	9.91	9.70	9.47	9.22	8.96	8.68	8.39
20–24	8.78	8.73	8.65	8.56	8.44	8.30	8.14	7.97
25–29	7.61	7.66	7.69	7.70	7.69	7.66	7.61	7.54
30–34	6.59	6.72	6.83	6.92	7.00	7.06	7.10	7.12
35–39	5.68	5.87	6.04	6.20	6.35	6.48	6.60	6.70
40–44	4.87	5.09	5.30	5.51	5.72	5.91	6.09	6.27
45–49	4.13	4.37	4.61	4.85	5.10	5.34	5.57	5.80
50–54	3.45	3.70	3.95	4.21	4.48	4.75	5.02	5.29
55–59	2.82	3.06	3.31	3.57	3.84	4.13	4.42	4.72
60–64	2.22	2.44	2.67	2.92	3.18	3.46	3.75	4.05
65–69	1.65	1.84	2.04	2.25	2.49	2.74	3.00	3.29
70–74	1.12	1.26	1.42	1.59	1.78	1.98	2.20	2.44
75 and over	1.11	1.28	1.47	1.68	1.91	2.17	2.46	2.78

Age group	r= 0050	r= .0025	r= .000	r= −.0025	r= −.0050	r= −.0075	r= −.0100	r= −.0125
Under 5	8.97	8.30	7.65	7.04	6.45	5.90	5.37	4.87
5–9	8.63	8.08	7.55	7.03	6.52	6.04	5.57	5.11
10–14	8.36	7.92	7.50	7.07	6.64	6.22	5.81	5.40
15–19	8.08	7.76	7.43	7.09	6.75	6.41	6.06	5.70
20–24	7.77	7.55	7.33	7.08	6.83	6.56	6.28	5.98
25–29	7.44	7.32	7.19	7.04	6.87	6.69	6.48	6.25
30–34	7.12	7.16	7.06	7.00	6.92	6.81	6.69	6.53
35–39	6.79	6.85	6.90	6.93	6.93	6.91	6.87	6.80
40–44	6.43	6.57	6.70	6.81	6.90	6.97	7.01	7.02
45–49	6.03	6.24	6.44	6.63	6.80	6.95	7.09	7.19
50–54	5.57	5.83	6.10	6.35	6.60	6.83	7.06	7.25
55–59	5.02	5.33	5.64	5.95	6.26	6.56	6.86	7.13
60–64	4.37	4.69	5.03	5.38	5.73	6.08	6.43	6.77
65–69	3.59	3.91	4.24	4.59	4.95	5.32	5.70	6.08
70–74	2.70	2.97	3.27	3.58	3.91	4.26	4.62	4.99
75 and over	3.15	3.53	3.97	4.43	4.94	5.49	6.09	6.92

[1] See footnote to table 1C.

Table 1B.—*Age distribution of stabilized populations for different true rates of natural increase (r), based on the life tables for the colored population of the United States, 1929–31* [1]

Age group	r= .0100	r= .0075	r= .0050	r= .0025	r= .0000	r= −.0025	r= −.0050	r= −.0075	r= −.0100
Under 5	12.09	11.35	10.64	9.93	9.27	8.61	7.98	7.38	6.80
5–9	11.26	10.71	10.16	9.69	9.08	8.55	8.02	7.51	7.01
10–14	10.61	10.22	9.82	9.40	8.99	8.57	8.14	7.72	7.30
15–19	9.88	9.63	9.37	9.09	8.79	8.49	8.17	7.84	7.51
20–24	9.02	8.91	8.78	8.62	8.45	8.26	8.06	7.82	7.58
25–29	8.15	8.15	8.13	8.08	8.02	7.94	7.83	7.71	7.56
30–34	7.31	7.40	7.47	7.52	7.56	7.58	7.57	7.54	7.49
35–39	6.50	6.66	6.81	6.94	7.07	7.17	7.25	7.32	7.36
40–44	5.69	5.91	6.12	6.31	6.51	6.69	6.85	7.00	7.13
45–49	4.89	5.14	5.39	5.63	5.88	6.12	6.35	6.56	6.77
50–54	4.09	4.35	4.62	4.89	5.17	5.44	5.72	5.99	6.26
55–59	3.29	3.55	3.81	4.09	4.37	4.66	4.96	5.26	5.56
60–64	2.55	2.78	3.03	3.28	3.56	3.84	4.14	4.45	4.76
65–69	1.88	2.08	2.29	2.52	2.76	3.02	3.29	3.58	3.88
70–74	1.29	1.44	1.61	1.79	1.99	2.21	2.44	2.68	2.95
75 and over	1.50	1.72	1.95	2.26	2.53	2.85	3.22	3.63	4.08

[1] See footnote to table 1C.

TABLE 1C.—*Age distribution of stabilized populations for different true rates of natural increase (r), based on hypothetical life table* [1]

Age group	r= .0100	r= 0075	r= 0050	r= 0025	r= 0000	r= −.0025	r= − 0050	r= −.0075	r= −.0100
Under 5	9 66	8 94	8 24	7 58	6 95	6 34	5.77	5 24	4.73
5-9	9 12	8 55	7 98	7 43	6 90	6 38	5.88	5 40	4 94
10-14	8 64	8 20	7 75	7 31	6 87	6.43	6.00	5 58	5.17
15-19	8.18	7 86	7 53	7 19	6.84	6.48	6 12	5 77	5.41
20-24	7 72	7 51	7 28	7 04	6 78	6 51	6 23	5 94	5.64
25-29	7 27	7 16	7 03	6 88	6.71	6 52	6.32	6 10	5.87
30-34	6 82	6 80	6 76	6 70	6 62	6 52	6.39	6 25	6.09
35-39	6 39	6 45	6 50	6 52	6.52	6.50	6 46	6.39	6.30
40-44	5 98	6 12	6 23	6.34	6.42	6 47	6 51	6.53	6.52
45-49	5 57	5 77	5 95	6 13	6 28	6 42	6 54	6 64	6.71
50-54	5 15	5 39	5 64	5 88	6 10	6.32	6 51	6.69	6 85
55-59	4.69	4.98	5.27	5 56	5 85	6.13	6 40	6.66	6.91
60-64	4.17	4 49	4 81	5 14	5 47	5 80	6 14	6.47	6 79
65-69	3 58	3 89	4.23	4 57	4 93	5.29	5.67	6.05	6.43
70-74	2 89	3 18	3 50	3 83	4 18	4 55	4 93	5 33	5 73
75-79	2 08	2.33	2 59	2.87	3 17	3.50	3 84	4.20	4.58
80 and over	2 09	2 37	2 70	3 02	3.40	3.83	4.29	4.78	5.31

[1] The stabilized age compositions were computed on the basis of the formula given in footnote 7. The r values in tables 1A and 1B are based on the respective life tables of the Metropolitan Life Insurance Co. The r's of table 1C were derived from the hypothetical life table based on assumed ratios to the New Zealand mortalities, taken from Dublin and Lotka (*2*), page 194.

combined with the mortality rates, as expressed by three different life tables.[7] They are given in tables 1A, 1B, and 1C. The stable age compositions of table 1A are based on the life tables for the white population in the United States as of 1929–1931; those of table 1B are based on the life tables of the Negro population of 1929–1931; and those of table 1C were derived on the basis of the hypothetical life table.[8] Thus, the column headed with a true rate of natural increase of −.0025 ($r=-.0025$) in table 1A, for instance, shows the stabilized age composition of a population with such a true rate of increase, when the existing mortality rates of the white population are assumed. Likewise, the corresponding column in table 1B assumes the mortality of the Negro life table, while that of table 1C refers to the hypothetical life table. These three age compositions, it should be noted, differ, although they are based on the same true rates of natural increase. The Negro life table shows the youngest age structures because of its higher mortality; the hypothetical life table shows the oldest age structures because of its lower mortality.

As stated above, any concrete population, no matter what its prevailing age composition is, if subjected to the assumptions mentioned, would in due time reach such a stabilized age composition. Studies of different types of populations, different with respect to their true rates

[7] The following formula was used for computing the different stabilized age compositions: $c(a)=s(a)e^{-ra}/\Sigma s(a)e^{-ra}$; see ref (*3*). These symbols have the following meanings: $c(a)$ is the proportion of persons in the stabilized population at age a; e is the natural base of logarithms; r is the calculated or postulated true rate of increase; $s(a)=p(a)=L_x$ in the corresponding life tables. This formula is equivalent to Lotka's equations (ref. *1*, page 329). See also ref. (*2*).

[8] See footnote to table 1C.

of natural increase as well as their prevailing age compositions, have shown that within two generations, about 60 years, such populations will practically attain the theoretically computed stabilized age compositions, assuming the mentioned postulates to remain unchanged (*5*, *11*). Of course, such a constancy of either fertility or mortality for such a length of time is not to be expected. Yet the fact that such an adjustment could practically be accomplished within 60 years, or even less, becomes the underlying principle of the method. The use of the method will be illustrated by concrete examples.

III

The white population of the United States had about reached a stationary true rate of natural increase around 1930, and it declined below that rate in the years following (*6*). Two main questions may arise in connection with such a change. What changes in the age structure of the population can be anticipated owing to such changes in true growth? The student of education, for instance, may concern himself with the expected relative magnitude of the younger age groups with respect to the total population; on the other hand, the student of old-age pensions may be interested in the older age groups, whereas the concern of other students of social problems may be the general changes in the structure of the population. The answer to this question can be read directly from the different columns in table 1. In a population of zero rate (table 1A, $r=0$), assuming the present mortality of the white population, 7.65 percent of the total population would be under 5 years of age, and 16.51 percent 60 years and over; under the same conditions of mortality, in a population of a negative r, say $r=-.0025$, 7.04 and 17.98 percent would be in the respective age groups.[9] The same r values on the hypothetical life table would give, for the age group under 5 years, 6.95 and 6.34 percent, and for the group 60 years and over, 21.15 and 22.97 percent, respectively, showing much older populations (table 1C). In the same manner all other stabilized age compositions may be considered. The latter reveal immediately what changes in the age structures may be expected under different "true" rates of increase combined with different mortality rates.

The chief interest, however, may lie not only in finding the expected relative degree of concentration within the age groups, but also in estimating the expected actual numbers either of the total population or of the separate age groups. This may be of specific concern in dealing with populations of zero or negative r values.

[9] The corresponding percentages in 1930, as reported by the Census, were 9.1 and 9.0. The r of $-.0025$ for the white population corresponds to a net reproduction rate of 0.93 (see table 2), which was practically the rate of the white population in the United States in 1935 (*6*).

It is a well-established fact, although not commonly realized, that zero or negative true rates of increase do not signify immediate cessation of growth or immediately declining populations. In spite of such true rates, the populations may keep on increasing for a while, owing to the so-called "favorable" age structure of the populations. This intermediate growth is of significance, for it is of interest to know what increase in numbers may be expected owing to the effects of the age factors before the population becomes either stationary or begins to decline. This is the second main question which arises in connection with declining rates of natural increase, and it, too, can be easily answered.

TABLE 2.—*True yearly rates of natural increase and their corresponding net reproduction rates, and stabilized birth and death rates, based on the life tables for the white and colored population of the United States, 1929–31, and the hypothetical life table* [1]

True yearly rates of natural increase (r)	Net reproduction rates (R_o) based on life tables			Stabilized birth rates based on life tables			Stabilized death rates based on life tables		
	White	Negro	Hypothetical	White	Negro	Hypothetical	White	Negro	Hypothetical
0.0100	1.32	1.30	1.32	22.80	27.59	20.40	12.80	17.59	10.40
0.0075	1.23	1.22	1.23	21.08	25.75	18.77	13.58	18.25	11.27
0.0050	1.15	1.14	1.16	19.44	23.99	17.20	14.44	18.99	12.20
0.0025	1.07	1.07	1.07	17.88	22.27	15.72	15.38	19.77	13.22
0.0000	1.00	1.00	1.00	16.39	20.63	14.31	16.39	20.63	14.31
−0.0025	.93	.94	.93	14.97	19.06	12.99	17.47	21.56	15.49
−0.0050	.87	.88	.87	13.64	17.56	11.76	18.64	22.56	16.76
−0.0075	.81	.82	.81	12.39	16.13	10.59	19.89	23.63	18.09
−0.0100	.75	.77	.75	11.22	14.77	9.51	21.22	24.77	19.51

[1] The net reproduction rates were computed on the basis of the formula $(1+r)^T = R_o'(1)$, where "r" is the true yearly rate of increase, given in the first column of the table. T stands for the length of a generation, and R_o designates the computed net reproduction rates. The lengths of a generation (T) were calculated as 28.05, 26.30, and 28.11 years for the white, the Negro, and hypothetical life tables, respectively. The stabilized birth rates were computed as $1/\Sigma s(a)e^{-ra}$ (see footnote 7). The stabilized death rate is, of course, calculated by subtracting from the stabilized birth rate the corresponding true rate of natural increase ($1{,}000r$).

If it be true that within 60 years a population could adjust itself so that the prevailing age structure would be practically that of the theoretically computed stabilized age composition, then the population of 1930, if this year is taken as the starting point, would attain in 1990 the age structure of the stabilized age composition. The survivors of the population of 1930 will, of course, in 1990 constitute the age groups of 60 years and over. Their numbers are easily calculated on the basis of the survival factors (L_{x+60}/L_x), as given in table 3. It is necessary to deal in this connection with only the first nine 5-year age groups, those under 45 years of age. On this basis, assuming the mortality rates of 1929–31 to continue, there would be about 22,994,000 survivors of the 1930 white population in 1990. In a stationary population these survivors would constitute 16.51 percent of the total population (table 1A, $r=0$); in a population with an r value of $-.0025$, they would make up 17.98 percent of the population.

By dividing the number of survivors by 16.51, an estimate of population that may be expected of a zero true rate of increase is obtained;

TABLE 3.—*Survival factors for white and Negro populations, 1929–31* [1]

Age groups	L_{x+15}/L_x Male	L_{x+15}/L_x Female	L_{x+30}/L_x Male	L_{x+30}/L_x Female	L_{x+45}/L_x Male	L_{x+45}/L_x Female	L_{x+60}/L_x Male	L_{x+60}/L_x Female
	WHITE							
Under 5	0.82686	0.85514	0.77690	0.81609	0.71075	0.76287	0.62445	0.68970
5–9	.78871	.82664	.72155	.77273	.63395	.69862	.52374	.59903
10–14	72724	77739	.63894	.70284	.52787	.60265	39678	.47451
15–19	.64543	.70834	.53323	.60737	.40081	.47823	26006	.32816
20–24	.54134	.61527	.40691	.48445	.26402	.33242	.13634	.18381
25–29	.41435	.49253	.26885	.33797	.13884	.18688	.05230	.07659
30–34	.27440	.34430	.14170	.19038	.05338	.07803	.01290	.02121
35–39	14528	.19449	05473	.07971	.01323	.02167	.00158	.00320
40–44	.05657	.08182	.01367	02224	.00163	.00329	.00006	.00018
45–49	.01431	.02302	.00171	.00340	.00007	.00019		
50–54	.00182	.00357	.00007	.00020				
55–59	.00008	.00021						
	NEGRO							
Under 5	0.62365	0.64523	0.54744	0.56803	0.46467	0.47899	0.37932	0.38801
5–9	55917	.57922	.47463	.48843	.38745	.39658	.29924	.30902
10–14	.47963	.49289	.39153	.40020	.30239	.31184	.21361	.22908
15–19	.39961	40937	30863	31898	.21802	.23524	.13648	.16109
20–24	.32094	.33242	.22672	.24515	.14192	.16787	.07441	.10335
25–29	.23922	.25787	.14974	.17658	.07852	.10871	.03047	.05444
30–34	.15928	.18692	.08352	.11507	.03242	05762	.00752	.01980
35–39	.08970	.12267	.03482	.06143	.00807	.02111	.00077	.00377
40–44	.03798	.06640	.00881	.02282	.00084	.00408	.00002	.00023
45–49	.00980	.02512	.00094	00449	.00002	.00026		
50–54	00107	00510	.00002	00029				
55–59	00002	.00034						

[1] Based on the life tables of the Metropolitan Life Insurance Co. 1929–31.

TABLE 3A.—*Hypothetical life table (both sexes)* [1]

Age group	L_x	L_{x+15}/L_x	L_{x+30}/L_x	L_{x+45}/L_x	L_{x+60}/L_x
Under 5	97,079	.90428	.87853	.84220	.78743
5–9	96,391	.88480	.84821	.79305	.71453
10–14	95,994	.85172	.79633	.71748	.60855
15–19	95,532	.80018	.72095	.61149	.46434
20–24	94,795	.72656	.61625	.46795	.29698
25–29	93,792	.62284	.47295	.30015	.14639
30–34	92,537	.47937	.30422	.14837	.05083
35–39	91,148	.30886	.15063	.05161	.01151
40–44	89,656	.15314	.05247	.01170	
45–49	87,787	.05358	.01195		
50–54	85,287	.01230			
55–59	81,760				
60–64	76,443				
65–69	68,874				
70–74	58,417				
75–79	44,359				
80–84	28,152				
85–89	13,730				
90–94	4,704				
95–99	1,049				

[1] Based on hypothetical life table given in ref. (*2*), p. 194.

by using 17.98 as the divisor, the expected numbers are estimated on the basis of $r=-.0025$. Obviously, once the number of survivors has been computed, a simple procedure in itself, as many different r values as desired may be used and corresponding population estimates immediately obtained.

IV

Based on a zero true rate of natural increase, the white population of the United States was estimated by this method as 139,273,000 in

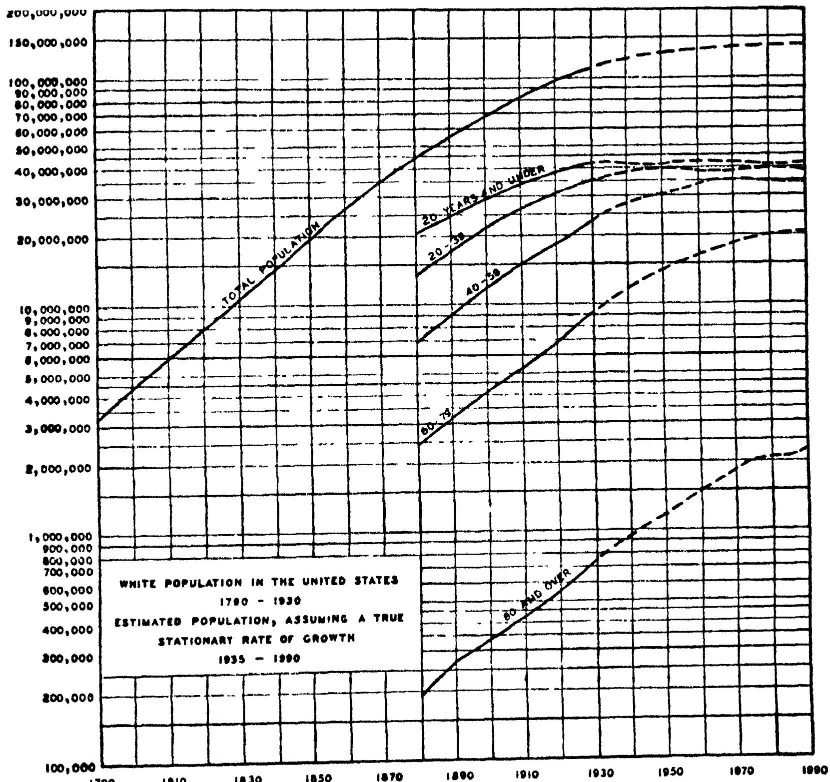

FIGURE 1.

1990. By the direct method, namely, using the survival factors by 5-year age periods (L_{x+5}/L_x) and gradually building up the younger age groups,[10] an estimate of 137,844,000 white persons was obtained for 1990 (fig. 1). The stabilized method gave an overestimate of about 1 percent when compared with the estimate by the direct method. As seen from table 4, the percentage differences for 1980

[10] For a concrete example of this procedure see ref. (3).

and 1985 are practically of no significance. Even the estimate for 1975 is only 1 percent short of that obtained by the direct method.[11]

To check further the accuracy of such estimates, comparisons between this and the direct method were made for Tennessee, representing potentially a rapidly growing population, and Illinois, representing a potentially declining population. In 1930 Tennessee registered a net reproduction rate of 1.33, which corresponds to a true yearly rate of increase of about .0100 (see table 2); in 1930 Illinois

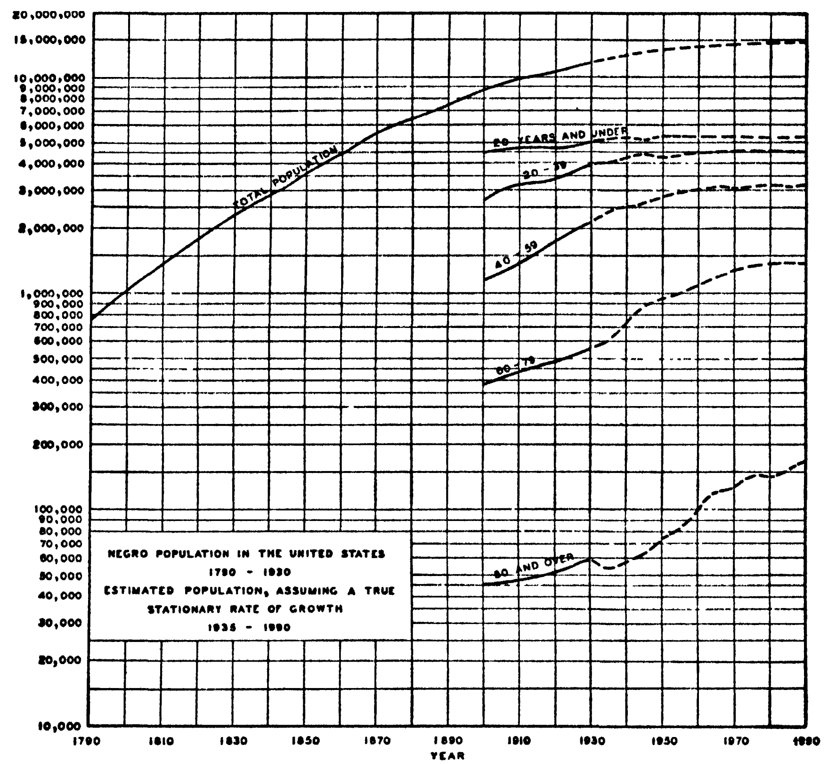

FIGURE 2.

had a net reproduction rate of .90, corresponding to a true yearly rate of increase of —.00375.[12] There were also computed by the two methods estimates for the Negro population, assuming a true zero rate of growth and the Negro mortality rates of 1929-1931 (fig. 2).

Apparently the greatest discrepancies (table 4) were found in the estimates of the Negro population, and these were due to no fault of

[11] Theoretically, any single age group should suffice as a basis for such estimates. One could, for instance, use only the group under 5 years of age in 1930, and by dividing its survivors ($L_{62.5}/L_{2.5}$) by the percent of population in the 60-64 group of the stabilized population, obtain an estimate of the population in 1990. Such a procedure would, however, increase the probable margins of errors, as the percent of each group is small in relation to the total population, and the errors would thus be accentuated. Therefore, all survivors making up the age group 45 and over were used for estimating the population in 1975, all survivors of 50 and over for 1980, all survivors of 55 and over for 1985, and the survivors of 60 and over for 1990.

[12] See footnote to table 4.

the method, but to the inadequacy of the basic Negro population data.[13] All other discrepancies seemingly fluctuate around 1 percent.

V

It should be reemphasized that the main purpose of this method is to supply a procedure by which reliable population forecasts may be obtained with a minimum of effort. Once such estimates are obtained for the total population, one can, of course, without difficulty compute estimates for the various age groups by applying to the totals the percental age distribution of the corresponding stabilized population. It is preferable to make such estimates for age groups larger than 5-year age intervals. Total population estimates computed by this method are given in table 5 for the white and Negro populations in the United States assuming different *r* values in combination with different life tables. Similar estimates can be calculated for any State in the Union or for any particular population class, either by postulating certain *r* values or by taking the actual ones.[14]

TABLE 4.—*Comparison of population estimates by the stabilized and direct methods* [1]

Population class	Net reproduction rate (R_0)	True rate of increase (r)	Year	Estimated populations (in thousands) Method: Direct	Estimated populations (in thousands) Method: Stabilized	Percentage difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(6):(5)
U. S. white	1.00	0.0000	1975	136,541	135,159	−1.0
Do	1.00	0.0000	1980	137,260	136,833	−0.3
Do	1.00	0.0000	1985	137,682	138,257	+0.4
Do	1.00	0.0000	1990	137,844	139,273	+1.0
Tennessee	1.33	0.0100	1975	3,882	3,805	−2.0
Do	1.33	0.0100	1980	4,102	4,045	−1.4
Do	1.33	0.0100	1985	4,326	4,288	−0.9
Do	1.33	0.0100	1990	4,556	4,528	−0.6
Illinois	.90	−0.0375	1975	7,758	7,689	−0.9
Do	.90	−0.0375	1980	7,632	7,600	−0.4
Do	.90	−0.0375	1985	7,495	7,493	0.0
Do	.90	−0.0375	1990	7,351	7,363	+0.2
U. S. Negro	1.00	0.0000	1975	14,368	13,818	−3.8
Do	1.00	0.0000	1980	14,431	13,917	−3.6
Do	1.00	0.0000	1985	14,474	13,995	−3.3
Do	1.00	0.0000	1990	14,502	14,011	−3.2

[1] The net reproduction rates for Tennessee and Illinois (col. 2) were taken from Karpinos (6). The corresponding *r*'s (col. 3) are based on table 2 of this paper. The *r* for Illinois was interpolated on an arithmetic basis as the midvalue of *r*=.0025 and *r*=.0050. All estimates are based on the mortality rates of 1929-31.

[13] The abnormal sex ratios of the Negro population are chiefly responsible for the greater discrepancies. Estimates confined to the Negro female population gave the percentage differences as −1.0, 0.6, −0.4, and −0.3 for the years 1975, 1980, 1985, and 1990, respectively.

[14] True rates of natural increase (*r*) for the total white population of each State in the United States in 1929-1931 were published by Dublin and Lotka (*2*). Net reproduction rates for the white population of each State, for each population class within the State (rural farm, rural nonfarm, total urban, and for groups of cities of different sizes), and for the larger individual cities were published by Karpinos (*6, 7*). Their corresponding *r* values are easily interpolated from table 2. The net reproduction rates and the true rates of natural increase for the Negro population in 1930, by States, are given in ref. (*8*).

The first step in this procedure is to compute the survivors of the given population on the basis of the desired life table. In computing the survivors for 1975, taking 1930 as the starting point, L_{x+45}/L_x is used; for 1980 L_{x+50}/L_x is used, L_{x+55}/L_x for 1985, and L_{x+60}/L_x for 1990. The calculated number of survivors is then divided by the proportion of the total population that these survivors constitute in the respective stabilized populations.

TABLE 5.—*Population estimates in the United States in 1975, assuming different true rates of growth and different mortality rates*

Assumed mortality rates [1]		Assumed true rates of growth (r per 1,000)		Projected populations, 1975 [1] (in millions)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
White	*Negro*	*White*	*Negro*	*White*	*Negro*	*Total*
WLT	NLT	2.5	2.5	145 7	15.4	161 1
WLT	NLT	0 0	0 0	136 5	14.4	150 9
WLT	NLT	0 0	2 5	136 5	15 4	151 9
WLT	NLT	−2 5	0.0	128 3	14 4	142 7
WLT	NLT	−2 5	−2 5	128 3	13 4	141 7
WLT	WLT	2 5	2.5	145 7	17.9	163 6
WLT	WLT	0.0	0 0	136 5	16.8	153 3
WLT	WLT	0 0	2 5	136 5	17.9	154 4
WLT	WLT	−2 5	0 0	128 3	16 8	145 1
WLT	WLT	−2.5	−2.5	128 3	15.8	144 1
HLT	WLT	2 5	2.5	154.4	17.9	172.3
HLT	WLT	0 0	0.0	145 0	16 8	161 8
HLT	WLT	0 0	2 5	145.0	17.9	162 9
HLT	WLT	−2.5	0 0	136.5	16.8	153.3
HLT	WLT	−2 5	−2.5	136.5	15 8	152.3

[1] WLT and NLT indicate the White and Negro life tables as of 1929–31. HLT stands for the hypothetical life table. The data are from Karpinos (8).

The method assumes a constancy of fertility and mortality. This shortcoming is obviously overcome by the fact that as many estimates as desired may be obtained by assuming different r values and different mortality rates. Concretely, suppose that the white population in the United States will increase for a certain period at a zero r, then at $r = -.0025$, and later at $r = -.0050$. The first r value would give an estimate of 135 million persons for 1975; the second r value would estimate the population as 127 million for the same year; and the third would bring down the estimate to 120 million. It may thus be very reliably expected, on the basis of these estimates, that the white population of the United States would be about 127 million persons. This would obviously be equivalent to a continuous zero r. Moreover, other estimates based on the hypothetical life table may be added, as was partially done in table 5, and from all these estimates either one estimate may be obtained or the various estimates listed separately, the assumed r's and mortality being indicated.

The other presupposition, absence of migration, which is involved in determining the stabilized age compositions, seems to be of no great

importance as a contributing factor to the future growth of the population of the United States as a whole. Migration, however, is unquestionably significant in estimating the population of individual States. Yet such estimates, without taking migration into account, so easily

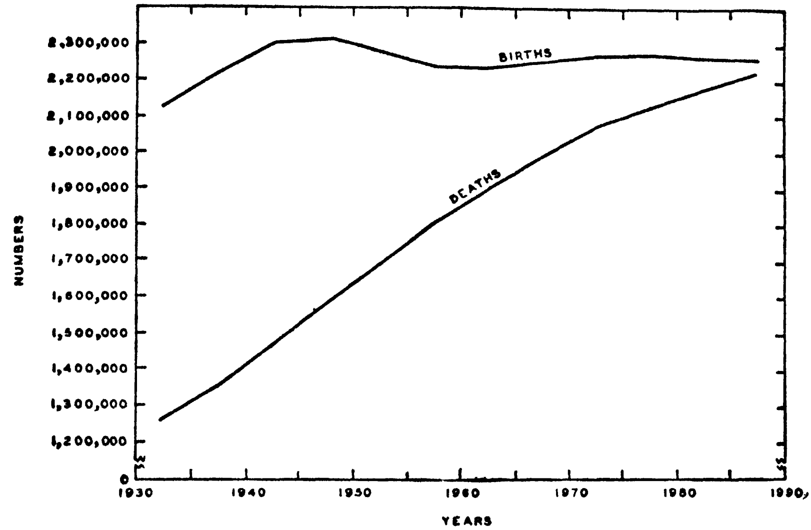

FIGURE 3A.—Estimated births and deaths of the white population in the United States (1935–90) assuming a stationary rate of growth and the mortality rates of 1930.

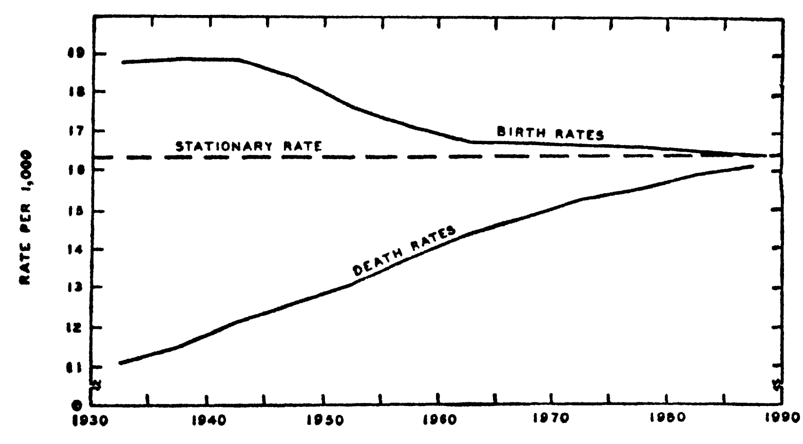

FIGURE 3B.—Estimated birth and death rates of the white population in the United States (1935–90) assuming a stationary rate of growth and the mortality rates of 1930.

obtained, appear to be of marked interest even for States and cities, since they reveal immediately the size and structure of the population which may be expected in a State or city or for a particular population group if the increase continues according to a given or assigned

fertility and mortality. Such estimates add meaning to the indices of reproductivity. Furthermore, inter- and intrastate migrations are of such undetermined character that, no matter what assumptions are made, and these have to be limited, migration estimates appear to be of questionable value, especially from the point of view of long-range forecasts.

At the same time this method may be easily used for predicting the expected number of births and deaths under the assumed or assigned fertility and mortality. For example, the expected number of the white population for the United States based on a zero true rate of increase was estimated for 1975 as 136.5 million persons. The corresponding birth and death rates, given in table 2, were both computed as 16.39. Evidently, about 2.2 million (136.5×.1639) births

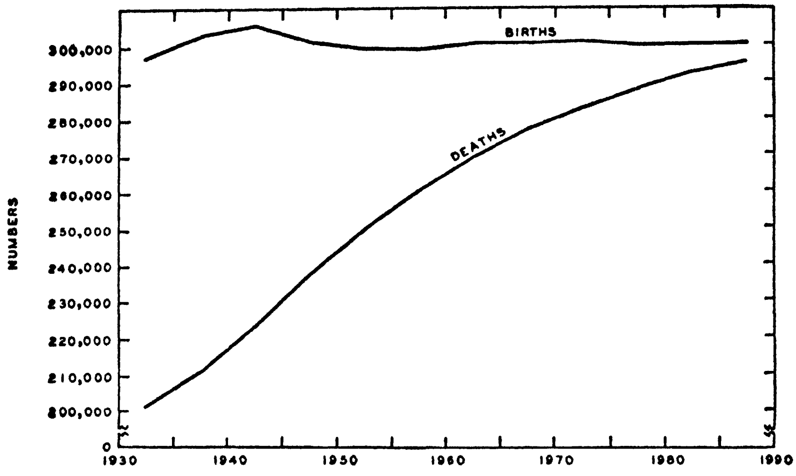

FIGURE 4A.—Estimated birth and death rates of the Negro population in the United States (1935-90) assuming a stationary rate of growth and the mortality rates of 1930.

may be expected annually and, of course, the same number of deaths for a stationary population (see fig. 3). A true rate of increase of —2.5 per 1,000 would bring the estimated white population of the United States in 1975 to about 128.3 million persons (table 5), and the annual number of births and deaths to 1.9 and 2.2 millions, respectively, the birth rate for such a true rate of increase being 14.97 and the death rate 17.47 (table 2). On the basis of a zero true rate of increase on the hypothetical life table, the estimated white population would be about 145 millions, and the expected annual births and deaths 2.1 millions. Obviously, even with lower mortality an annual minimum of about 2 million births would be required to keep the white population in the United States from ultimate decline. With the existing mortality rate, about 300 thousand births (14.4 million×.2063; see tables 2 and 5) among Negro population would be needed annually

to preclude a potential decline in that group (see fig. 4), and about 275 thousand births, assuming that the mortality of the Negro will fall to the level of the mortality of the whites as of 1930 (16.8 million × .1639).

In the same manner, the expected number of births and deaths for any population can be computed, based on any desired fertility and mortality. It is of specific significance to the student of population to be able to estimate the number of births and deaths necessary for a given population to maintain its numbers; such estimates should prove a very helpful guide in population analysis.

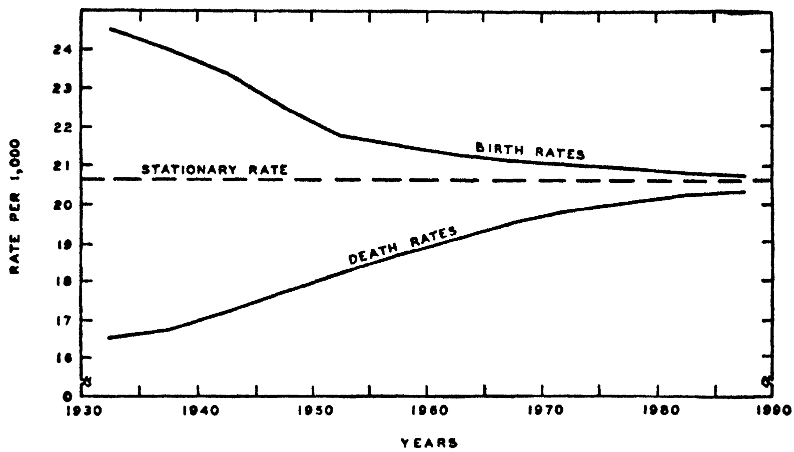

FIGURE 4B.—Estimated births and deaths of the Negro population in the United States (1935–90) assuming a stationary rate of growth and the mortality rates of 1930.

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STUDIES OF A FILTER-PASSING INFECTIOUS AGENT ISOLATED FROM TICKS

V. FURTHER ATTEMPTS TO CULTIVATE IN CELL-FREE MEDIA. SUGGESTED CLASSIFICATION [1]

By HERALD R. COX, *Associate Bacteriologist, United States Public Health Service*

In a previous paper (*1*) the characteristics of the filter-passing rickettsia-like organism isolated from the Rocky Mountain wood tick, *Dermacentor andersoni*, were described, and it was shown to be pathogenic for certain animals as well as man (*2*, *3*, *4*). The successful cultivation of this agent in modified Maitland tissue culture was also reported, and its failure to grow in ordinary bacteriological media or to survive beyond the sixth subculture in cell-free media of the type commonly employed for growing bartonellae. In the experiments in which bartonella media were used, the cultures were incubated at 37.5° and 32° C., temperatures somewhat higher than commonly employed for these organisms.

These tests have, therefore, been repeated to determine (*a*) if this agent can be maintained in serial passage when incubated at 28° C., and (*b*) how long it can survive without transfer at this temperature.

MATERIALS AND METHODS

Two types of media were employed: (*a*) Noguchi's leptospira medium (*5*) prepared with rabbit serum,[2] and (*b*) the same medium containing, in addition, 0.2 percent of each of the following sugars: Glucose, lactose, sucrose, maltose, and inulin.

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[1] Contribution from the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

[2] See the following table:

	Parts
0.9 percent NaCl	800
Fresh rabbit serum	100
2.0 percent nutrient agar (pH 7 4)	100
Rabbit hemoglobin (made by laking 1 part of defibrinated blood with 3 parts of distilled water)	10 to 20

Two infected guinea pig spleens were used to prepare separate 5-percent tissue suspensions in Tyrode's solution. Each suspension was centrifuged (2,500 r. p. m. for 20 minutes) and the supernatant portion passed through a new Berkefeld N filter. Twelve tubes of each type of medium each received 1 cubic centimeter of one filtrate and an equal number each received 1 cubic centimeter of the other. Filtrates were used to eliminate the possibility of cells being present in the inoculum. The tubes were stoppered with cotton and incubated at 28° C.

In the attempt to maintain the infectious agent in serial passage, 2 series of transfers were initiated, one from a tube without sugars (experiment 1) and the other from a tube with sugars (experiment 2). The successive subcultures were transferred every 8 to 14 days. The dilution factor was approximately 1 to 4. At each subtransfer Giemsa stained smears were prepared and examined for visible organisms, and a titration test was carried out in guinea pigs to determine the end point of infectivity of the culture material. For the latter tests 1 cubic centimeter amounts of the undiluted culture material and of progressive tenfold dilutions were injected intraperitoneally. These dilutions were made in a mixture containing equal volumes of filtered human ascitic fluid and Tyrode's solution. All animals that survived were later tested for immunity.

In the tests to determine longevity a filtrate-inoculated tube without sugars (experiment 3) and one with sugars (experiment 4) were selected at irregular intervals and tested by smears and by guinea pig inoculation of each culture and its decimal dilutions in the same manner as that described for experiments 1 and 2.

EXPERIMENTAL DATA

Experiments to maintain the infectious agent in serial transfer.—There was no apparent growth of the infectious agent in either of the original culture tubes inoculated with the spleen filtrates or in any of the transfer tubes. Furthermore, no organisms were ever observed in the Giemsa stained smears.[3]

Tables 1 and 2 present the data pertaining to the guinea pig inoculation tests made with the successive subcultures in experiments 1 and 2, respectively. These data suggest that multiplication of the infectious agent did not occur since there was a gradual increase in the incubation period in inoculated guinea pigs and a gradual decrease in the infectivity of the inocula through 6 subcultures. Material from the seventh and eighth subcultures caused no reaction.

[3] These experiments were controlled by cultivating 2 strains of *Bartonella bacilliformis* under the same conditions. No difficulty was had in maintaining these cultures and typical, good growth was observed in all transfer culture tubes. The writer is indebted to Dr. Peter K. Olitsky of the Rockefeller Institute for Medical Research for one of the strains, and to Dr. David Weinman of Harvard University Medical School for the other.

Further evidence of absence of multiplication is afforded by the fact that the infectious agent did not survive without a decrease in the infective titer. Thus, in both experiments the Berkefeld filtrates used as inocula were infectious in a dilution of 1:100,000, while the infective end point was reached in the sixth subculture tubes, representing a dilution of approximately 1 : 16,000 in terms of the original inocula. If the infectious agent had survived without loss the subculture tubes of the seventh, and possibly even the eighth, transfer would have been infectious.

TABLE 1.—*Experiment 1: Test data showing lack of multiplication of the infectious agent in leptospira medium without sugar. (Cultures initiated with Berkefeld N filtrate of suspension of spleen tissue from guinea pig A26157)*

Material titrated	Date	Day on which transferred	Dilution factor in terms of original inoculum	Incubation period, in days, of guinea pigs injected with undiluted and decimal dilutions of the initial inoculum and of the serial subcultures in leptospira medium							
				Dilutions tested							
				10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7
Berkefeld N filtrate inoculum	Dec. 16, 1938	------	----------	3, 5, 6	7	6	8	9	10	[1]N. I.	N I.
Original leptospira culture	Dec. 27, 1938	11th	1·4	5	6	8	10	N I	N I	N I	-----
First subculture	Jan 5, 1939	9th	1:16	7	9	7	N I.	N I.	N I.	N I.	-----
Second subculture	Jan 13, 1939	8th	1 64	6	12	7	8	N I.	N I.	--	-----
Third subculture	Jan. 23, 1939	10th	1:256	10	10	12	11	N I.	N I	------	-----
Fourth subculture	Feb. 2, 1939	8th	1:1,024	11	16	N I.	N I	N I.	N I.	------	-----
Fifth subculture	Feb. 10, 1939	8th	1:4,096	9	N I.	N.I.	N I.	N.I.	----	------	-----
Sixth subculture	Feb. 20, 1939	10th	1.16,384	11	N I.	N I.	N I	-----	-----	---	-----
Seventh subculture	Mar. 2, 1939	10th	1.65,536	N I.	N.I.	N I	N I.	------	------	------	-----
Eighth subculture	Mar. 16, 1939	14th	1·262,144	N I	N I.	N I	N I	----	----	------	-----

[1] N. I.=animal failed to react and found nonimmune on subsequent test.

TABLE 2.—*Experiment 2: Test data showing lack of multiplication of the infectious agent in leptospira medium containing glucose, lactose, sucrose, maltose and inulin. (Cultures initiated with Berkefeld N filtrate of suspension of spleen tissue from guinea pig A26158.)*

Material titrated	Date	Day on which transferred	Dilution factor in terms of original inoculum	Incubation period, in days, of guinea pigs injected with undiluted and decimal dilutions of the initial inoculum and of the serial subcultures in leptospira medium							
				Dilutions tested							
				10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7
Berkefeld N filtrate inoculum	Dec. 16, 1938	------	----------	3, 3, 3	7	5	6	5	12	[1] N. I.	N. I.
Original leptospira culture	Dec. 27, 1938	11th	1·4	6	6	9	9	11	N. I.	N. I.	------
First subculture	Jan. 5, 1939	9th	1:16	6	7	8	10	N. I.	N. I.	------	------
Second subculture	Jan. 13, 1939	8th	1:64	7	9	10	9	N. I.	N. I.	------	------
Third subculture	Jan. 23, 1939	10th	1·256	9	13	10	N. I.	N. I.	------	------	------
Fourth subculture	Feb. 2, 1939	8th	1·1,024	8	10	11	N. I.	N. I.	------	------	------
Fifth subculture	Feb. 10, 1939	8th	1:4,096	10	11	10	N. I.	N. I.	------	------	------
Sixth subculture	Feb. 20, 1939	10th	1:16,384	15	N. I.	N. I.	N. I.	N. I.	------	------	------
Seventh subculture	Mar. 2, 1939	10th	1:65,536	N. I.	N. I.	N. I.	N. I.	------	------	------	------
Eighth subculture	Mar. 16, 1939	14th	1:262,144	N. I.	N. I.	N. I	N. I.	------	------	------	------

[1] N. I.=animal failed to react and found nonimmune on subsequent test.

These results were substantiated by experiments in which 0.5 cubic centimeters of the undiluted leptospira subcultures of the fourth, fifth, seventh, and eighth transfers of both series were inoculated into duplicate tissue cultures of the modified Maitland or Rivers type.[4] In both tests typical rickettsia-like organisms were found in the tissue cultures representing the fourth and fifth leptospira media transfers, but not in those representing the seventh and eighth passages.

Length of survival without transfer in cell-free media.—Tables 3 and 4 present the data pertaining to the animal inoculation tests made in experiments 3 and 4. These data show that in each of the experiments the infectious agent survived without transfer for at least 109 days in cell-free media without appreciable loss of infective titer. No evidence was obtained that the infectious agent was multiplying in the cell-free medium. The only apparent change in the culture medium was a concentration due to evaporation to approximately one-half the original volume. No evidence of growth was observed in any of the tubes, nor was it possible at any time to demonstrate the organism in the Giemsa-stained smears prepared from the culture media.

DISCUSSION

The results of these experiments confirm the work previously reported (*1*), indicating that the rickettsia-like agent being studied cannot be cultivated and carried in serial passage in cell-free media commonly employed for bartonellae.

TABLE 3.—*Experiment 3: Data showing survival of the infectious agent in non-transferred cultures of leptospira medium without sugar. (Cultures initiated with Berkefeld N filtrate of suspension of spleen tissue from guinea pig A26157)*

Material titrated	Date	Day tested	Incubation period, in days, of guinea pigs injected with undiluted and decimal dilutions of the initial inoculum and of the leptospira medium cultures							
			Dilutions tested							
			10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7
Berkefeld N filtrate inoculum	Dec. 16, 1938	--------	3, 5, 6	7	6	8	9	10	[1] N. I.	N. I.
Culture 1	Dec. 27, 1938	11th	5	6	8	10	N. I.	N. I.	N. I.	-------
Culture 2	Jan. 5, 1939	20th	5	5	8	10	N. I.	N. I.	N. I.	-------
Culture 3	Jan. 13, 1939	28th	7	8	9	8	15	N. I.	N. I.	-------
Culture 4	Feb. 2, 1939	48th	6	8	11	12	N. I.	N. I.	N. I.	-------
Culture 5	Feb. 20, 1939	66th	7	8	8	9	10	N. I.	-------	-------
Culture 6	Mar. 3, 1939	77th	6	6	10	12	N. I.	N. I.	-------	-------
Culture 7	Apr. 4, 1939	109th	10	8	12	14	15	N. I.	-------	-------

[1] N. I.=animal failed to react and found nonimmune on subsequent test.

[4] These consisted of minced yolk sac of the developing chick embryo suspended in filtered human ascitic fluid. After 8 to 12 days incubation at 37.5° C., smears were prepared from the cellular portion and stained with Giemsa.

TABLE 4.—*Experiment 4: Data showing survival of the infectious agent in nontransferred cultures of leptospira medium containing glucose, lactose, sucrose, maltose, and inulin. (Cultures initiated with Berkefeld N filtrate of suspension of spleen tissue from guinea pig A26158)*

Material titrated	Date	Day tested	Incubation period, in days, of guinea pigs injected with undiluted and decimal dilutions of the initial inoculum and of the leptospira medium cultures							
			Dilutions tested							
			10^{0}	10^{1}	10^{2}	10^{3}	10^{4}	10^{5}	10^{6}	10^{7}
Berkefeld N filtrate inoculum	Dec. 16, 1938	....	3, 3, 3	7	5	6	5	12	[1] N. I.	N. I.
Culture 1	Dec. 27, 1938	11th	6	6	9	9	11	N. I.	N. I.	N. I.
Culture 2	Jan. 5, 1939	20th	5	7	7	10	13	N. I	N. I.	......
Culture 3	Jan. 13, 1939	28th	4	5	7	9	12	14	N. I.	......
Culture 4	Feb. 2, 1939	48th	6	6	9	11	10	15	N. I.	......
Culture 5	Feb. 20, 1939	66th	6	6	10	N. I.	N. I.	N. I.	N. I	......
Culture 6	Mar. 3, 1939	77th	5	7	7	9	10	N. I.	N. I.	......
Culture 7	Apr. 4, 1939	109th	6	9	9	10	12	N. I.	N. I.	......

[1] N. I.=animal failed to react and found nonimmune on subsequent test.

Its ability to pass filters that ordinarily retain bacteria, bartonellae, and rickettsiae, and to survive for relatively long periods in cell-free leptospira media and its failure to produce agglutinins for *Proteus* strains of bacteria would, perhaps, justify the placing of this organism in a new genus. However, it is deemed most suitable to classify it tentatively with the rickettsiae. Since the outstanding characteristic differentiating this agent from the known pathogenic rickettsiae is its property of filterability, the name *Rickettsia diaporica* [5] (*diaporica* is derived from the Greek word and means having the property or ability to pass through) is proposed.

CONCLUSION

The results of these experiments confirm the work previously reported (*1*), indicating that the rickettsia-like agent being studied cannot be cultivated and carried in serial passage in cell-free media commonly employed for the growth of bartonellae.

SUMMARY

Further attempts to cultivate the filter-passing infectious agent isolated from the Rocky Mountain wood tick, *Dermacentor andersoni*, in cell-free leptospira media have failed. It survived in serial passage through six subcultures, but was not demonstrated in later subcultures. In culture tubes kept at 28° C. it survived for at least 109 days with no appreciable loss of infective titer. The name *Rickettsia diaporica* is proposed for this organism.

[5] The writer is indebted to Prof. W. P. Clark of the University of Montana for the derivation of this name.

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THE INFLUENCE OF TRANSPLANTED NORMAL TISSUE ON BREAST CANCER RATIOS IN MICE*

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In earlier publications (*1, 2*) it was mentioned that the incidence of breast cancer for a few BAF_1 and BAF_2 hybrid females which had been inoculated with normal tissue from cancer stock animals was higher than was observed in the control groups. Owing to these observations the inoculated mice were omitted from tabulations of these classes in later papers (*3, 4*).

Grafts of splenic, thymic, and lactating mammary tissue were used as inocula, and were injected by means of a trochar. The spleens and thymus glands were from "A" high cancer stock females which averaged 4 to 5 weeks in age. The spleens were cut into five approximately equal parts and the thymus divided by lobes before being injected. The donors of the mammary glands were lactating "A" stock females which had cast their first or second litters.

The age of the mice when they were inoculated varied. Some were 4 to 5 weeks old and others had had their first litters. As far as could be determined with the number used there was little or no difference in the results. The tissues were inoculated into two groups of "B" (C57 black) stock females, one nursed by C57 black females and the other nursed by females from high tumor stocks. The BAF_1 mice were obtained by mating "B" strain females to "A" stock males and the young nursed their mothers. The offspring were mated *inter se* to obtain the BAF_2 hybrids. All the injected mice were used as breeders.

In table 1 the different classes of mice are tabulated according to the tissue inoculated, and in table 2 all of the inoculated animals of each class are grouped and compared with the control animals. Con-

* Supported by a grant from the National Cancer Institute.

sidering the stocks from the standpoint of the tissue inoculated, it will be noted that, with the exception of the "B" stock mice nursed by high tumor mothers and receiving mammary tissue grafts, there is little variation in the observed tumor percentages. The breast tumor ages, based on very small numbers, are of little significance.

TABLE 1.—*Results obtained following the transplantation of normal tissue from potentially cancerous individuals into low tumor stock mice*

Stock	Nursed by	Tissue inoculated	Number	Percent cancer	Average age, in months	
					Cancerous	Noncancerous
B	Low Ca. ♀	Mammary	13	0		15 7
B	High Ca. ♀	do	8	37 5	13 9	19 2
BAF_1	Low Ca. ♀	do	14	21.5	15 0	16 4
B	do	Thymus	13	0		14 9
B	High Ca. ♀	do	11	9 1	17 5	18.7
B	Low Ca. ♀	Spleen	22	4 5	17 7	14 9
B	High Ca ♀	do	18	5 6	10 3	16 1
BAF^1	Low Ca ♀	do	32	21 9	15 6	20 2
BAF_2	do	do	11	18 2	16 0	18 2

TABLE 2.—*Comparison of data in animals inoculated with normal tissue and in groups serving as controls. All were used as breeders*

Stock	Nursed by	Class	Number	Percent cancer	Average age, in months	
					Cancerous	Noncancerous
B	Low Ca ♀	Inoculated	48	2 1	17 7	15 1
B	High Ca. ♀	do	37	13 5	13 9	17 4
BAF_1	Low Ca. ♀	do	46	21 7	15 4	19 0
BAF_2	do	do	11	18 2	16 0	18 2
B	do	Controls	586	5	21 4	20 8
B	High Ca ♀	do	104	10 6	13.2	16.6
BAF_1	Low Ca. ♀	do	108	1.9	18 0	21.1
BAF_2	do	do	112	0		20.7

One "B" strain female developed breast cancer in the groups inoculated with grafts from "A" stock mice (table 2). The percentage was 2.1 for the 48 mice used. The control breast tumor ratio for this group taken from Little, Murray, and Cloudman (*5*) was 0.5 percent. The number of fostered "B" stock females receiving grafts was 37, of which 13.5 percent developed breast cancer as compared with a ratio of 10.6 percent for the control fostered animals. The breast tumor ratios for the inoculated and control BAF_1 hybrid mice were 21.7 percent and 1.9 percent respectively. Similar data for the BAF_2 hybrids were 18.2 percent and 0 percent.

Seventeen BAF_2 mice descended from the inoculated BAF_1 females were observed to have a breast tumor incidence of 29.4 percent

(±7.7). This ratio was 11.2 percent (±11.0) greater than was recorded for the inoculated mice of this generation.

The differences observed for the inoculated and control mice of the respective "B" stock classes were not mathematically significant (table 3). The degree of significance between the inoculated fostered and the inoculated control "B" stock mice was 2.9×P. E., and for the control unfostered and the control fostered series it was 5.1×P. E. The difference in the observed breast tumor ratios between the injected and noninjected BAF_1 mice was 19.8 percent (±4.2), or 4.7×P. E. As only 11 BAF_2 mice were inoculated, the recorded difference of 18.2 percent (±7.8) was not great enough to be significant. BAF_2 females descended from inoculated BAF_1 females gave an incidence 29.4 percent (3.8×P. E.) greater than the control BAF_2 mice. There were 28 BAF_2 females either inoculated or descended from inoculated mothers having a tumor ratio of 25 percent (±5.4). The degree of significance was 4.6×P. E. when this percentage was compared with that observed for the control class.

TABLE 3.—*Comparison of ratios obtained in the control and inoculated groups, and degree of significance between ratios*

Ratio	Stock	Nursed by	Class	Number	Percent cancer	Difference between ratios
1	B	Low Ca ♀	Inoculated	48	2.1±1.4	1 and 2=1.6 percent±1.4 or 1.1×P. E.
2	B	do	Controls	586	.5±.2	1 and 3=11.4 percent±4.0 or 2.9×P. E.
3	B	High Ca ♀	Inoculated	37	13.5±3.8	2 and 4=10.1 percent±2.0 or 5.1×P. E.
4	B	do	Controls	104	10.6±2.0	3 and 4=2.9 percent±4.5 or 0.6×P. E.
5	BAF_1	Low Ca. ♀	Inoculated	46	21.7±4.1	5 and 6=19.8 percent±4.2 or 4.7×P. E.
6	BAF_1	do	Controls	108	1.9±.8	
7	BAF_2	Low Ca ♀	Inoculated	11	18.2±7.8	7 and 8=18.2 percent±7.8 or 2.3×P. E.
8	BAF_2	do	Controls	112	0.0	

DISCUSSION

In the etiology of inherited breast cancer in "A" and "B" stock mice and their hybrids it has been assumed that three "influences" must be present (*3*, *4*):

(*a*) The breast cancer producing influence transmitted in the milk of high breast tumor stock females.

(*b*) An inherited susceptibility.

(*c*) A hormonal stimulation.

In these studies it has been observed that very few animals develop breast tumors if one or more of the "influences" are absent. If tumors develop in such animals it is unusual to find that they are transmitted to their progeny.

Experiments determining the breast tumor incidence in the "B", or C57 black, stock mice following foster nursing or forced breeding (the functional test as described by Bagg) have demonstrated subline

variations within this strain (*4*, *6*, *7*, *8*). In this work the difference observed between the "B" stock mice nursed by low cancer mothers and those nursed by high cancer stock females may be explained on this basis. No significant variation was recorded between the inoculated and control mice of these respective classes. Thus, the few breast tumors that developed in fostered "B" stock mice which had been inoculated with normal tissue may have been influenced by the effects of foster nursing.

In the inoculated BAF_1 and the BAF_2 mice which were injected or were descended from inoculated BAF_1 females, ratios were observed which were mathematically significant as compared with those observed for the control groups. According to our theory of breast cancer development, the BAF_1 mice would lack only the "influence" which is generally obtained from nursing high tumor stock females. First generation mice should receive the breast cancer susceptibility complex from their "A" stock fathers. Seventy-five percent of the BAF_2 should theoretically need only the influence of nursing, while the others should lack, in addition, the susceptibility constitution. When normal tissue from 4- to 5-week-old females of the "A" high tumor stock was transplanted into these hybrid animals, it is probable that the so-called "breast cancer producing influence" was present in the grafted tissue in a sufficient quantity to initiate the development of breast cancer in some mice in the presence of the other "influences." This might indicate that this influence is present not only in the milk of potentially cancerous stock females but is probably present in many, if not all, of the tissues of such individuals. The reason why it is not transferred *in utero* is not apparent.

BAF_1 females receiving the "breast cancer producing influence" by way of transplanted tissues are able to transmit the influence, by nursing, to some of their BAF_2 progeny. The incidence of breast cancer among the progeny is not as high, however, as when the F_1 females were nursed by high tumor stock mothers. Comparable observations were obtained for the progeny of "A" stock females which nursed their "A" stock mothers for less than 24 hours before being fostered to low tumor stock females (*9*), that is, the progeny of the fostered "A" stock mice which developed breast cancer gave a lower incidence than did the control animals.

Six "B" stock females in the inoculated groups developed mammary carcinoma. One had been nursed by its low cancer stock mother and the others had been transferred to high cancer stock females. Among these five were two pairs of sisters and by chance three of the five, including one from each pair of sisters, were among the eight inoculated with mammary tissue.

The grafts were placed in the right axillary region by means of a trochar. In the inoculated mice 20 spontaneous tumors were observed in 18 animals. Of this number 5, or 25 percent, of the growths developed in the right axillary region. Three were found in animals injected with mammary tissue. None of the nine tumor mice which had received splenic tissue had growths appearing near the injection site and in several animals the grafts were recovered at autopsy.

SUMMARY

By the inoculation of normal tissue from young high cancer stock female mice, an influence may be transmitted which produces results similar to those of the "breast cancer producing influence" normally obtained in the milk while nursing.

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DEATHS DURING WEEK ENDED SEPTEMBER 16, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 16, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,447	7,480
Average for 3 prior years	[1] 7,131	
Total deaths, first 37 weeks of year	308,697	301,889
Deaths under 1 year of age	458	529
Average for 3 prior years	[1] 509	
Deaths under 1 year of age, first 37 weeks of year	18,605	19,581
Data from industrial insurance companies:		
Policies in force	66,702,292	68,288,474
Number of death claims	11,008	11,124
Death claims per 1,000 policies in force, annual rate	8.6	8.5
Death claims per 1,000 policies, first 37 weeks of year, annual rate	10.2	10.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 23, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	3	1	----	----	----	----	157	26	6	8
New Hampshire	0	0	0	0	----	----	----	----	51	5	0	0
Vermont	0	0	2	0	----	----	----	----	0	0	1	3
Massachusetts	7	6	4	4	----	----	----	----	20	17	27	11
Rhode Island	0	0	0	0	----	----	----	----	99	13	0	0
Connecticut	3	1	1	2	----	----	7	3	9	3	7	7
MID. ATL.												
New York	3	8	11	14	[1] 2	[1] 3	[1] 5	[1] 6	14	35	57	52
New Jersey	1	1	7	10	4	3	4	5	11	9	8	14
Pennsylvania	7	14	11	25	----	----	----	----	12	24	17	30
E. NO. CEN.												
Ohio	7	9	11	28	2	2	----	4	4	5	6	12
Indiana	19	13	20	20	----	----	15	14	4	3	0	6
Illinois [1]	13	20	25	40	3	5	12	12	7	10	15	21
Michigan [2]	6	6	9	9	2	2	----	----	19	18	28	18
Wisconsin	0	0	2	4	62	35	28	16	35	20	50	41
W. NO. CEN.												
Minnesota	8	4	9	6	2	1	----	----	25	13	15	11
Iowa	10	5	2	3	2	1	----	----	6	3	5	8
Missouri	10	8	14	14	----	----	15	26	4	3	6	9
North Dakota	0	0	3	3	102	14	2	2	15	2	37	2
South Dakota	30	4	8	1	8	1	----	----	38	5	1	1
Nebraska	15	4	5	3	----	----	----	----	4	1	0	1
Kansas	8	8	6	6	----	----	1	1	8	3	4	4

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 23, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median
SO. ATL.												
Delaware	20	1	0	0					39	2	0	0
Maryland [2,4]	6	2	7	8	6	2	7	6	15	5	10	6
Dist. of Col.	16	2	4	5			2		8	1	1	0
Virginia	66	35	50	35	69	37	85		19	10	6	6
West Virginia	27	10	16	27	5	2	13	20	5	2	5	5
North Carolina [3,4]	150	103	123	67				1	10	7	26	17
South Carolina [3]	98	36	38	21	420	157	212	135	0	0	3	2
Georgia [3]	68	41	69	30	13	8	20		0	0	12	0
Florida [3]	27	9	10	10	9	3		1	3	1	22	1
E. SO. CEN.												
Kentucky	33	19	27	27			20	2	7	4	3	13
Tennessee [4]	41	23	45	45	30	17	38	17	7	4	10	10
Alabama [3]	88	50	51	51	35	20	30	11	2	1	34	3
Mississippi [2,3]	38	15	17	22								
W. SO. CEN.												
Arkansas	37	15	25	11	7	3	13	8	5	2	1	1
Louisiana [3]	41	17	16	16	7	3	2	7	2	1	11	9
Oklahoma	16	8	15	10	10	5	25	17	2	1	3	1
Texas [3]	27	32	33	44	58	70	54	38	7	8	4	7
MOUNTAIN												
Montana	9	1	1	1			7	5	47	5	48	3
Idaho	0	0	0	2					20	2	4	1
Wyoming	0	0	2	0					196	9	2	2
Colorado	53	11	13	6	39	8			24	5	6	6
New Mexico	12	1	6	2				1	0	0	4	6
Arizona	12	1	6	2	405	33	28	9	0	0	4	8
Utah [3]	0	0	0	0			15		10	1	4	2
PACIFIC												
Washington	6	2	2	1					204	66	8	10
Oregon	20	4	2	1	30	6	3	11	99	20	7	5
California	7	9	28	30	8	10	11	15	44	54	167	44
Total	22	553	759	759	21	451	674	471	17	429	704	569
38 weeks	15	14,292	17,399	17,399	191	153,627	48,389	105,936	373	350,598	763,765	671,536

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	1	12	2	2	5
New Hampshire	0	0	0	0	10	1	0	0	10	1	3	3
Vermont	0	0	0	0	40	3	0	0	0	0	6	5
Massachusetts	1.2	1	0	1	7	6	1	2	36	31	40	51
Rhode Island	0	0	0	0	0	0	0	0	0	0	1	5
Connecticut	0	0	0	0	12	4	0	0	33	11	12	12
MID. ATL.												
New York	0.8	2	4	4	51	128	5	19	23	57	74	99
New Jersey	0	0	0	1	45	38	3	4	39	33	23	23
Pennsylvania	2	4	3	3	25	50	8	8	54	106	121	121

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 23, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0	0	0	1	9	12	1	16	61	80	89	111
Indiana	0	0	1	1	4	3	0	3	40	27	37	53
Illinois [4]	1.3	2	0	3	9	13	6	12	61	93	109	156
Michigan [2]	1.1	1	0	1	56	53	4	20	89	84	125	76
Wisconsin	5	3	0	1	11	6	6	6	105	60	63	68
W. NO. CEN.												
Minnesota	0	0	0	1	101	52	4	4	60	34	35	35
Iowa	0	0	0	0	10	5	2	3	57	28	18	36
Missouri	0	0	1	0	1.3	1	3	3	17	13	44	44
North Dakota	0	0	1	0	0	0	0	2	44	6	9	9
South Dakota	0	0	0	0	0	0	2	2	83	11	3	4
Nebraska	0	0	1	1	0	0	0	0	61	16	6	6
Kansas	8	3	2	0	8	3	0	3	95	34	47	47
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	118	6	1	1
Maryland [2] [4]	3	1	1	1	6	2	1	5	83	27	10	19
Dist. of Col.	0	0	0	0	16	2	2	2	40	5	7	8
Virginia	0	0	1	1	4	2	2	4	37	20	30	21
West Virginia	2.7	1	4	2	5	2	0	3	91	34	46	47
North Carolina [3] [4]	0	0	0	1	4	3	1	1	92	63	58	58
South Carolina [3]	0	0	2	0	22	8	1	0	52	19	10	9
Georgia [3]	0	0	0	0	3	2	1	1	38	23	18	18
Florida [3]	0	0	1	0	6	2	0	0	9	3	6	5
E. SO. CEN.												
Kentucky	3	2	2	2	12	7	0	1	57	33	66	58
Tennessee [4]	4	2	2	2	0	0	1	1	76	43	33	36
Alabama [3]	0	0	2	2	1.8	1	4	2	46	26	18	18
Mississippi [2] [3]	0	0	1	1	2.5	1	0	1	28	11	5	15
W. SO. CEN.												
Arkansas	0	0	0	0	2.5	1	1	1	22	9	11	6
Louisiana [3]	0	0	0	0	0	0	0	2	15	6	4	10
Oklahoma	0	0	0	0	4	2	0	0	8	4	19	9
Texas [4]	0	0	0	0	6	7	0	3	12	14	28	24
MOUNTAIN												
Montana	0	0	1	0	9	1	2	2	122	13	0	11
Idaho	0	0	2	0	0	0	1	1	31	3	8	8
Wyoming	0	0	0	0	22	1	0	2	1,113	51	1	1
Colorado	5	1	0	0	29	6	0	2	77	16	13	13
New Mexico	0	0	0	0	173	14	1	1	136	11	7	2
Arizona	0	0	0	0	25	2	0	2	12	1	9	5
Utah [2]	0	0	0	0	30	3	0	0	40	4	2	10
PACIFIC												
Washington	0	0	0	0	3	1	1	6	25	8	11	16
Oregon	0	0	0	0	15	3	0	2	30	6	33	20
California	0	0	0	1	27	33	2	27	66	80	66	88
Total	0.9	23	32	49	19	484	66	274	50	1,266	1,387	1,671
38 weeks	1.6	1,502	2,317	4,446	5	4,439	1,302	5,566	127	121,228	142,286	170,459

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 23, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934–38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	4	1	127	21	15
New Hampshire	0	0	0	0	10	1	0	0	30	3	0
Vermont	0	0	0	0	27	2	0	0	375	28	16
Massachusetts	0	0	0	0	1	1	1	4	107	91	65
Rhode Island	0	0	0	0	0	0	0	1	45	6	13
Connecticut	0	0	0	0	12	4	1	3	190	64	54
MID ATL.											
New York	0	0	0	0	6	15	23	23	130	324	472
New Jersey	0	0	0	0	14	12	5	11	129	108	173
Pennsylvania	0	0	0	0	9	17	16	43	157	310	261
E. NO. CEN.											
Ohio	7	9	1	0	11	14	12	30	93	121	65
Indiana	1	1	6	0	12	8	3	16	67	45	8
Illinois [4]	1	1	0	0	46	70	19	26	140	214	338
Michigan [2]	0	0	1	1	12	11	14	14	160	151	291
Wisconsin	0	0	0	1	4	2	3	3	206	117	327
W. NO. CEN.											
Minnesota	0	0	1	1	8	4	4	4	140	72	39
Iowa	8	4	1	1	4	2	3	7	38	19	18
Missouri	0	0	1	0	17	13	14	21	32	25	26
North Dakota	7	1	0	1	0	0	3	3	58	8	17
South Dakota	8	1	4	0	0	0	0	1	68	9	3
Nebraska	0	0	1	1	0	0	3	1	15	4	8
Kansas	0	0	0	0	17	6	5	7	34	12	30
SO. ATL.											
Delaware	0	0	0	0	20	1	0	1	374	19	1
Maryland [2, 4]	0	0	0	0	9	3	13	18	136	44	29
Dist. of Col.	0	0	0	0	0	0	3	1	243	30	7
Virginia	0	0	0	0	22	12	24	24	19	26	41
West Virginia	0	0	0	0	32	12	21	21	19	7	39
North Carolina [3, 4]	1	1	0	0	10	7	15	18	69	47	147
South Carolina [3]	3	1	0	0	30	11	11	14	66	24	57
Georgia [3]	0	0	0	0	25	15	15	23	10	6	10
Florida [4]	0	0	0	0	3	1	6	4	15	5	30
E. SO. CEN.											
Kentucky	0	0	0	0	49	28	18	38	109	63	22
Tennessee [4]	0	0	1	0	28	16	21	31	42	24	26
Alabama [3]	0	0	0	0	11	6	15	15	25	14	47
Mississippi [2, 3]	0	0	0	0	10	4	1	6	-----	-----	-----
W. SO. CEN.											
Arkansas	0	0	0	0	52	21	15	7	22	9	16
Louisiana [3]	0	0	0	0	41	17	12	15	39	16	26
Oklahoma	6	3	0	0	40	20	15	21	16	8	3
Texas [3]	0	0	1	0	36	43	45	48	44	53	74
MOUNTAIN											
Montana	19	2	9	5	28	3	2	2	37	4	20
Idaho	0	0	0	0	20	2	1	1	20	2	3
Wyoming	0	0	0	0	0	0	2	0	524	24	3
Colorado	24	5	2	1	34	7	15	5	96	20	54
New Mexico	0	0	0	0	49	4	14	15	222	18	9
Arizona	0	0	0	0	25	2	1	3	233	19	10
Utah [2]	0	0	0	0	10	1	1	1	248	25	18

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended September 23, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934-38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases	1934-38, median	Sept. 23, 1939, rate	Sept. 23, 1939, cases	Sept. 24, 1938, cases
PACIFIC											
Washington	0	0	2	4	46	15	6	6	46	15	19
Oregon	0	0	8	0	35	7	3	4	0	0	15
California	2	2	3	1	7	8	13	18	93	113	175
Total	1	31	42	42	18	451	444	600	96	2,387	3,140
38 weeks	5	4,791	12,894	6,233	10	9,662	10,886	11,192	148	139,425	161,455

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended September 23, 1939, 97 cases as follows North Carolina, 1; South Carolina, 7; Georgia, 27; Florida, 7, Alabama, 17, Mississippi, 1; Louisiana, 5 Texas, 32.
[4] Rocky Mountain spotted fever, week ended September 23, 1939, 5 cases as follows Illinois, 1, Maryland, 1; North Carolina, 1; Tennessee, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
July 1939										
Arizona	4	59		13	0	4	9	13	5	9
Delaware				12	1		0	11	0	2
West Virginia	20	31		21	3	10	2	60	1	72
August 1939										
Alabama	70	61	1,047	29	5	29	4	76	0	69
District of Columbia	15	3		22	0		5	20	0	8
Florida	14	10	47	9	0	9	8	14	0	12
Georgia	121	30	353	26	3	148	12	44	1	107
Kansas	24	1	3	20	1	1	6	112	6	21
Louisiana	28	32	106	18	0	8	2	27	0	104
Maryland	7	1	1	15	3	2	3	47	0	40
Minnesota	21	6	5	92	0		156	83	2	16
Mississippi	90	1,184	8,197	183	2	424	2	22	0	45
Montana	3	24		45	1		0	30	0	11
Nebraska	10			4	1		8	26	3	3
New Jersey	9	6	1	52	3		52	61	0	28
Ohio	33	15	6	73	3		31	230	6	68
Oklahoma	23	238	275	15	3	13	5	24	5	88
Washington	5	1	1	206	0		4	34	0	13

Summary of monthly reports from States—Continued

July 1939

Disease and State	Cases
Chickenpox:	
Arizona	6
Delaware	2
West Virginia	11
Dysentery	
Arizona	63
West Virginia (bacillary)	24
German measles:	
Arizona	5
Mumps.	
Arizona	38
Delaware	8
West Virginia	27
Rabies in animals:	
Delaware	1
Rocky Mountain spotted fever	
West Virginia	2
Septic sore throat	
West Virginia	7
Trachoma	
Arizona	22
Undulant fever:	
Arizona	7
West Virginia	2
Whooping cough	
Arizona	41
Delaware	25
West Virginia	91

August 1939

Disease and State	Cases
Chickenpox:	
Alabama	5
District of Columbia	5
Florida	7
Georgia	5
Kansas	18
Louisiana	1
Maryland	20
Minnesota	25
Mississippi	120
Montana	19
Nebraska	6
New Jersey	94
Ohio	107
Oklahoma	5
Washington	59
Conjunctivitis, infectious:	
Georgia	8
Dengue	
Florida	4
Diarrhea	
Kansas (infectious)	1
Maryland	63
Ohio (under 2 years; enteritis included)	256
Dysentery	
Florida (amoebic)	7
Georgia (amoebic)	5
Georgia (bacillary)	16
Georgia (unspecified)	2
Kansas	1
Louisiana (amoebic)	9
Louisiana (bacillary)	3
Maryland (amoebic)	6
Maryland (bacillary)	36
Maryland (unspecified)	26
Minnesota (amoebic)	2
Minnesota (bacillary)	3
Mississippi (amoebic)	211
Mississippi (bacillary)	728
Montana (bacillary)	2
New Jersey (amoebic)	3
Ohio (amoebic)	2
Ohio (bacillary)	64
Oklahoma (amoebic)	1
Oklahoma (bacillary)	30
Washington (amoebic)	1
Encephalitis, epidemic or lethargic:	
Alabama	2
Florida	1
Kansas	1

August 1939—Continued

Disease and State	Cases
Encephalitis, epidemic or lethargic—Continued.	
Louisiana	1
Minnesota	1
Nebraska	1
Ohio	3
Washington	33
German measles:	
Alabama	2
Kansas	3
Maryland	3
New Jersey	24
Ohio	5
Washington	7
Hookworm disease	
Florida	372
Georgia	1,228
Louisiana	42
Mississippi	966
Oklahoma	1
Impetigo contagiosa:	
Kansas	5
Maryland	12
Montana	3
Ohio	80
Oklahoma	8
Washington	3
Lead poisoning	
Ohio	5
Leprosy	
Georgia	1
Louisiana	1
Mumps	
Alabama	24
Florida	12
Georgia	22
Kansas	113
Louisiana	8
Maryland	18
Mississippi	124
Montana	29
Nebraska	9
New Jersey	143
Ohio	205
Oklahoma	5
Washington	39
Ophthalmia neonatorum:	
Alabama	1
Maryland	3
Minnesota	1
Mississippi	7
Montana	1
New Jersey	12
Puerperal septicemia	
Georgia	2
Mississippi	30
Ohio	2
Rabies in animals	
Alabama	15
Florida	1
Louisiana	6
Minnesota	3
Mississippi	4
New Jersey	45
Oklahoma	20
Washington	11
Rabies in man:	
Washington	1
Rocky Mountain spotted fever.	
District of Columbia	3
Maryland	28
Montana	1
New Jersey	9
Ohio	4
Scabies:	
Kansas	3
Montana	10
Oklahoma	1
Septic sore throat:	
Florida	9
Georgia	96
Kansas	5
Louisiana	1
Maryland	14

August 1939—Continued

Disease and State	Cases
Septic sore throat—Con.	
Minnesota	15
Montana	8
Nebraska	1
New Jersey	10
Ohio	11
Oklahoma	19
Washington	2
Tetanus	
Alabama	5
Florida	1
Georgia	2
Kansas	4
Louisiana	4
Maryland	2
Montana	2
New Jersey	1
Ohio	2
Oklahoma	2
Trachoma:	
Georgia	1
Kansas	1
Louisiana	5
Maryland	2
Minnesota	1
Mississippi	8
Montana	24
Ohio	4
Washington	1
Trichinosis	
New Jersey	2
Tularaemia:	
Alabama	1
Georgia	9
Kansas	3
Louisiana	2
Maryland	1
Minnesota	1
Montana	2
Oklahoma	1
Washington	1
Typhus fever	
Alabama	87
District of Columbia	1
Florida	26
Georgia	195
Louisiana	16
Maryland	1
Mississippi	12
Undulant fever:	
Alabama	9
Florida	7
Georgia	14
Kansas	22
Louisiana	6
Maryland	15
Minnesota	11
Mississippi	3
Montana	1
New Jersey	7
Ohio	7
Oklahoma	118
Washington	1
Vincent's infection:	
Florida	4
Kansas	15
Maryland	6
Washington	1
Whooping cough	
Alabama	130
District of Columbia	162
Florida	41
Georgia	78
Kansas	88
Louisiana	89
Maryland	238
Minnesota	173
Mississippi	483
Montana	42
Nebraska	39
New Jersey	677
Ohio	870
Oklahoma	8
Washington	88

CASES OF VENEREAL DISEASES REPORTED FOR JULY 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,389	4.80	310	1.07
Arizona [1]				
Arkansas	752	3.67	231	1.13
California	1,533	2.49	1,168	1.90
Colorado	142	1.33	71	.66
Connecticut	221	1.27	101	.58
Delaware	234	8.97	56	2.15
District of Columbia	480	7.66	291	4.64
Florida	2,374	14.22	214	1.28
Georgia	1,750	5.67	35	.11
Idaho	21	.43	26	.53
Illinois	2,469	3.13	1,540	1.95
Indiana	390	1.12	108	.31
Iowa	255	1.00	163	.64
Kansas	249	1.34	113	.61
Kentucky	504	1.73	326	1.12
Louisiana	523	2.45	73	.34
Maine	35	.41	41	.48
Maryland	1,003	5.97	310	1.85
Massachusetts	409	.92	389	.88
Michigan	1,131	2.34	578	1.20
Minnesota	289	1.09	215	.81
Mississippi	3,344	16.53	2,723	13.46
Missouri	791	1.98	192	.48
Montana	44	.82	38	.71
Nebraska	51	.37	72	.53
Nevada [1]				
New Hampshire	16	.31	5	.10
New Jersey	1,094	2.52	322	.74
New Mexico	130	3.08	39	.92
New York	4,550	3.51	2,030	1.57
North Carolina	2,412	6.91	441	1.26
North Dakota	16	.23	25	.35
Ohio	782	1.16	293	.44
Oklahoma	796	3.12	304	1.19
Oregon	173	1.68	133	1.30
Pennsylvania	1,199	1.18	132	.13
Rhode Island	78	1.15	55	.81
South Carolina	1,646	8.78	288	1.54
South Dakota	19	.27	29	.42
Tennessee	1,178	4.07	485	1.68
Texas	3,928	6.36	924	1.50
Utah	16	.31	22	.42
Vermont	9	.23	29	.76
Virginia	1,675	6.19	287	1.06
Washington	228	1.38	256	1.54
West Virginia [1]				
Wisconsin	45	.15	128	.44
Wyoming	13	.55	11	.47
Alaska	8	1.28	21	3.35
Hawaii	55	1.35	52	1.28
Total	40,449	3.12	15,695	1.21

Reports from cities of 200,000 population or over [2]

Akron, Ohio	38	1.38	30	1.09
Atlanta, Ga	322	10.72	88	2.93
Baltimore, Md	685	8.20	210	2.51
Birmingham, Ala	345	11.72	62	2.11
Boston, Mass	161	2.02	144	1.81
Buffalo, N. Y	169	2.81	48	.80
Chicago, Ill	1,613	4.40	1,090	2.97
Cincinnati, Ohio	153	3.24	60	1.27
Cleveland, Ohio	209	2.21	92	.97

See footnotes at end of table.

Cases of venereal diseases reported for July 1939—Continued

Reports from cities of 200,000 population or over—Continued

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Columbus, Ohio	98	3.13	27	0.86
Dallas, Tex	232	7.63	110	8.62
Dayton, Ohio	96	4.33	34	1.53
Denver, Colo	65	2.16	48	1.59
Detroit, Mich	552	3.04	245	1.35
Houston, Tex	321	8.96	78	4.97
Indianapolis, Ind	25	.65	33	.86
Jersey City, N. J	27	.83	2	.06
Los Angeles, Calif	472	3.10	306	2.01
Louisville, Ky	139	4.10	80	2.36
Memphis, Tenn	342	11.71	141	4.83
Minneapolis, Minn	88	1.76	70	1.40
Newark, N. J	256	5.64	88	1.94
New Orleans, La	23	.47	64	1.31
New York, N. Y	3,455	4.61	1,609	2.15
Oakland, Calif	38	1.21	27	.86
Omaha, Nebr	28	1.25	35	1.57
Pittsburgh, Pa	328	4.65	18	.26
Portland, Oreg	78	2.43	67	2.09
Rochester, N. Y	21	.61	33	.96
St. Paul, Minn	31	1.08	29	1.01
San Francisco, Calif	130	1.89	184	2.67
Seattle, Wash	78	2.01	71	1.83
Syracuse, N. Y	85	3.77	9	.40
Washington, D. C	480	7.66	291	4.64

[1] No report for current month.
[2] No report received from Kansas City, Mo., Milwaukee, Philadelphia, Providence, St. Louis, San Antonio, or Toledo.

WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 16, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	119	53	14	134	309	360	2	332	82	1,086	-------
Current week [1]	83	40	8	87	256	224	0	324	58	1,002	-------
Maine:											
Portland	0	------	0	2	1	0	0	0	2	1	14
New Hampshire:											
Concord	0	------	0	1	0	0	0	1	0	0	12
Manchester	0	------	0	0	0	0	0	0	0	0	14
Nashua	0	----	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	----	------	------	------	------	------	------	------	------	------
Burlington	0	----	0	0	0	0	0	0	0	0	9
Rutland	0	----	0	0	0	0	0	0	0	0	6
Massachusetts:											
Boston	0	------	0	7	4	9	0	11	0	81	176
Fall River	0	------	0	0	1	0	0	0	0	6	19
Springfield	0	----	0	0	0	0	0	1	0	1	34
Worcester	0	------	0	0	8	2	0	2	0	10	46
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	16
Providence	0	------	0	8	2	2	0	1	0	28	43

[1] Figures for Barre, Vt., estimated; report not received.

City reports for week ended Sept. 16, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Connecticut:											
Bridgeport	0		0	0	0	2	0	0	0	0	35
Hartford	0		0	0	1	1	0	0	0	22	33
New Haven	0		0	1	0	0	0	0	0	2	44
New York:											
Buffalo	0		0	1	3	2	0	3	3	1	118
New York	9	4	1	16	44	19	0	73	11	126	1,225
Rochester	0		0	0	0	0	0	0	0	3	56
Syracuse	0		0	0	2	3	0	0	0	54	49
New Jersey:											
Camden	0		0	0	0	1	0	1	0	0	26
Newark	0	1	1	1	2	0	0	8	4	18	79
Trenton	0	1	0	0	1	0	0	6	0	4	43
Pennsylvania:											
Philadelphia	0	2	3	3	14	5	0	17	4	79	406
Pittsburgh	3		1	1	8	6	0	6	1	15	130
Reading	0		0	0	1	0	0	0	0	1	23
Scranton	0			0		0	0		0	0	
Ohio:											
Cincinnati	7	1	0	0	1	9	0	4	1	8	120
Cleveland	1	4	0	0	5	6	0	11	3	53	186
Columbus	3		0	3	2	1	0	2	1	4	77
Toledo	0		0	1	3	5	0	4	1	26	67
Indiana:											
Anderson	0		0	0	0	0	0	0	0	11	6
Fort Wayne	0		0	0	2	0	0	0	0	0	25
Indianapolis	3		0	0	2	5	0	2	0	24	84
Muncie	0		0	0	1	1	0	0	0	0	7
South Bend	0		0	0	1	0	0	0	0	4	11
Terre Haute	4		0	0	0	4	0	0	0	0	15
Illinois:											
Alton	0		0	0	0	0	0	1	0	0	10
Chicago	4	5	0	7	18	24	0	33	3	92	643
Elgin	0		0	0	0	1	0	0	0	6	6
Moline	1		0	0	0	0	0	0	0	0	13
Springfield	1		0	0	3	0	0	0	0	4	19
Michigan:											
Detroit	1	2	0	1	8	24	0	16	2	59	216
Flint	0		0	0	3	1	0	0	0	16	19
Grand Rapids	0		0	0	1	1	0	0	0	4	31
Wisconsin:											
Kenosha	0		0	0	0	0	0	0	0	4	5
Madison	0		0	3	0	0	0	0	0	6	30
Milwaukee	0		0	0	1	10	0	4	0	14	94
Racine	0		0	0	0	1	0	0	0	2	11
Superior	0		0	0	0	0	0	0	0	0	6
Minnesota:											
Duluth	0		0	1	0	0	0	0	0	0	18
Minneapolis	0		0	1	1	6	0	1	0	15	84
St. Paul	0		0	0	3	2	0	1	0	49	48
Iowa:											
Cedar Rapids	0			1		0	0		0	0	
Davenport	0			0		2	0		0	0	
Des Moines	0		0	0	0	2	1	0	0	0	43
Sioux City	1			0		0	0		0	2	
Waterloo	2			2		3	0		0	0	
Missouri:											
Kansas City	0		0	2	1	1	0	1	1	0	82
St. Joseph	0		0	0	2	0	0	0	0	0	26
St. Louis	2		0	1	5	2	0	5	4	20	185
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	4	8
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	0	0	0	0	0	2
South Dakota:											
Aberdeen	0			0		0	1		0	0	
Sioux Falls	0		0	0	0	2	0	0	0	0	10
Nebraska:											
Lincoln	0			0		0	0	0	0	1	
Omaha	0		0	0	3	1	0	2	0	4	68
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	1
Topeka	0		0	1	0	3	0	0	0	0	17
Wichita	0		0	2	2	0	0	1	0	12	21

City reports for week ended Sept. 16, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Delaware:											
Wilmington	0		0	1	2	1	0	0	0	4	25
Maryland:											
Baltimore	0		0	2	9	6	0	10	2	37	192
Cumberland	0	1	0	1	0	1	0	0	0	0	8
Frederick	0		0	0	1	0	0	0	0	0	3
District of Columbia:											
Washington	2		0	0	7	2	0	10	5	26	140
Virginia:											
Lynchburg	6		0	0	0	0	0	0	0	7	14
Norfolk	2		0	0	0	0	0	0	0	0	21
Richmond	1		0	0	5	2	0	1	1	4	49
Roanoke	1		0	0	0	0	0	1	0	6	17
West Virginia:											
Charleston	0		0	1	1	1	0	0	0	0	16
Huntington	2			0		0	0		0	0	
Wheeling	0		0	0	3	0	0	1	0	0	22
North Carolina:											
Gastonia	4			0		0	0		0	0	
Raleigh	0		0	0	1	0	0	1	0	0	24
Wilmington	0		0	0	0	1	0	0	0	0	13
Winston-Salem	1		0	0	0	1	0	6	0	0	24
South Carolina:											
Charleston	0	6	0	0	4	0	0	0	0	0	18
Florence	0		0	0	1	0	0	0	0	0	11
Greenville	0		0	0	0	0	0	0	0	0	5
Georgia:											
Atlanta	1		0	0	2	5	0	7	0	0	76
Brunswick	0		0	1	0	0	0	0	0	0	3
Savannah	7	7	0	0	0	0	0	2	0	2	23
Florida:											
Miami	1		0	0	3	1	0	4	0	0	38
Tampa	1	1	1	0	5	0	0	1	0	0	18
Kentucky:											
Ashland	0		0	0	1	0	0	0	0	0	7
Covington	0		0	0	2	3	0	0	0	0	18
Lexington	0		0	0	0	0	0	0	2	2	16
Louisville	0		0	1	0	6	0	4	1	21	83
Tennessee:											
Knoxville	3	1	0	0	1	3	0	1	0	0	20
Memphis	0		0	0	1	1	0	3	1	17	73
Nashville	0		0	0	3	3	0	1	0	6	50
Alabama:											
Birmingham	1		0	0	4	2	0	1	0	2	60
Mobile	2		0	0	0	1	0	2	0	0	31
Montgomery	0			0		0	0		0	0	
Arkansas:											
Fort Smith	1			0		0	0		0	0	
Little Rock	0		0	0	4	0	0	0	0	0	4
Louisiana:											
Lake Charles	0			0		0	0		0	0	
New Orleans	6		0	0	9	3	0	18	5	36	162
Shreveport	4		0	0	4	0	0	4	1	0	57
Oklahoma:											
Oklahoma City	0		0	0	0	0	0	1	3	0	42
Tulsa	0			0		0	0		1	0	
Texas:											
Dallas	6		0	0	2	2	0	0	0	6	57
Fort Worth	0		0	0	2	1	0	0	0	5	25
Galveston	0		0	0	2	0	0	2	0	0	26
Houston	1		0	0	2	1	0	4	0	1	59
San Antonio	0	2	0	0	5	0	0	3	0	1	57
Montana:											
Billings	0		0	0	0	0	0	0	0	0	8
Great Falls	0		0	0	2	1	0	0	0	0	10
Helena	0		0	0	0	0	0	0	0	0	6
Missoula	0		0	0	0	0	0	0	0	0	4
Idaho:											
Boise	0		0	0	0	0	0	0	1	0	8
Colorado:											
Denver	1		0	0	6	9	0	3	1	1	74
Pueblo	0		0	0	1	0	0	0	0	7	5

City reports for week ended Sept. 16, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	0	0	0	14
Utah.											
Salt Lake City	0	------	0	2	1	0	0	1	0	15	38
Washington:											
Seattle	0	------	0	3	5	1	0	2	0	4	81
Spokane	0	------	0	1	0	0	0	1	0	1	26
Tacoma	1	------	0	10	0	1	0	0	0	2	26
Oregon											
Portland	0	1	0	1	0	0	0	1	0	5	74
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	3	3	1	2	3	21	0	14	1	16	326
Sacramento	0	------	0	1	1	0	0	1	0	0	29
San Francisco	0	------	0	2	10	4	0	14	0	7	180

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
New Hampshire:			
Nashua	0	0	1
Massachusetts:			
Boston	0	0	4
Rhode Island:			
Providence	0	0	1
New York:			
Buffalo	0	0	51
New York	4	1	20
Rochester	0	0	2
Syracuse	0	0	1
New Jersey.			
Camden	0	0	6
Trenton	0	0	1
Pennsylvania:			
Philadelphia	0	0	31
Scranton	0	0	1
Ohio:			
Cleveland	0	0	1
Indiana:			
Terre Haute	0	0	1
Illinois			
Chicago	1	0	14
Michigan.			
Detroit	0	0	27
Wisconsin:			
Milwaukee	0	0	2
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	17
St. Paul	0	0	3
Missouri:			
Kansas City	0	0	2
St Louis	0	0	1

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
South Dakota:			
Aberdeen	0	0	1
Kansas:			
Topeka	0	1	0
Maryland:			
Baltimore	0	0	1
District of Columbia:			
Washington	0	0	1
West Virginia.			
Charleston	1	1	0
Huntington	0	0	1
Wheeling	0	0	1
South Carolina:			
Charleston	0	0	2
Kentucky:			
Covington	0	0	1
Alabama:			
Birmingham	1	0	0
Louisiana.			
Shreveport	0	1	0
Texas			
Dallas	0	0	1
Houston	0	0	1
Colorado			
Denver	0	0	1
Pueblo	0	0	2
New Mexico:			
Albuquerque	0	0	2
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	16
Sacramento	0	0	1
San Francisco	0	0	3

Encephalitis, epidemic or lethargic.—Cases: New York, 4, Kansas City, 1; Grand Forks, 1; Baltimore, 1; Fort Worth, 1, Great Falls, 1; Pueblo, 1

Pellagra.—Cases. Kansas City, 1; Charleston, S. C., 1.

Typhus fever—Cases Charleston, S C., 7; Atlanta, 1, Savannah, 2, Miami, 3; Tampa, 1; Lake Charles, 4; New Orleans, 2: Dallas, 3, Fort Worth, 1; Galveston, 3, Houston, 6.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended September 2 and 9, 1939.—During the weeks ended September 2 and 9, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended Sept. 2, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	1					2
Chickenpox				10	20	3	10	1	11	55
Diphtheria		1	1	14	2	2	5			25
Dysentery				5						5
Measles		4	1	48	16	15	4	1	8	97
Mumps				2	12	3			4	21
Pneumonia					5				1	6
Poliomyelitis		1		7	9	2	1			20
Scarlet fever		3		30	17	6	8	11	2	77
Trachoma							1			1
Tuberculosis		4	[1] 47	79	35	43	4	2		[1] 214
Typhoid fever and paratyphoid fever			4	16	7	4	3	1	1	36
Whooping cough		29		80	62	11	6	5	19	212

[1] Includes 33 cases delayed reports

NOTE.—No cases of the above diseases were reported in Prince Edward Island during the week ended Sept. 2, 1939.

Week ended Sept. 9, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1						1
Chickenpox		2	1	109	35	5	2	8	7	169
Diphtheria		1	3	23	2	3	25	1		58
Dysentery				10						10
Influenza		5			22				1	28
Measles				53	33	13	3		3	105
Mumps				42	18	5		1	2	68
Pneumonia		2			14				3	19
Poliomyelitis		3		1	13	1				18
Scarlet fever	2	9	6	36	50	12	2	9	5	131
Trachoma							1		1	2
Tuberculosis		8	23	54	19	2	38	1		145
Typhoid and paratyphoid fever			1	28	10	5		1	2	47
Whooping cough		13	5	76	86	11	10	12	6	219

Vital statistics—First quarter, 1939.—The Bureau of Statistics of the Dominion of Canada has published the following preliminary statistics for the first quarter of 1939. The rates are computed on an annual basis. There were 20.0 live births per 1,000 population during the first quarter of 1939 as compared with 20.3 during the first quarter

of 1938. The death rate was 10.8 per 1,000 population for the first quarter of 1939 and 10.5 per 1,000 population for the corresponding quarter of 1938. The infant mortality rate for the first quarter of 1939 was 72 per 1,000 live births and the same rate prevailed for the first quarter of 1938. The maternal death rate was 4.4 per 1,000 live births for the first quarter of 1939 and 4.5 per 1,000 live births for the same quarter of 1938.

The accompanying tables give the numbers of births, deaths, and marriages, by Provinces, for the first quarter of 1939, and deaths by causes in Canada for the first quarter of 1939 and the corresponding quarter of 1938:

Number of births, deaths, and marriages, first quarter 1939

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	55,677	30,136	4,026	244	11,955
Prince Edward Island	519	334	52	5	86
Nova Scotia	2,770	1,9 5	246	14	695
New Brunswick	2,816	1,423	260	16	452
Quebec	19,523	9,285	1,776	80	2,783
Ontario	15,935	10,661	893	68	4,341
Manitoba	3,339	1,645	201	16	785
Saskatchewan	4,073	1,443	222	17	741
Alberta	3,753	1,514	224	9	1,037
British Columbia	2,949	1,906	132	10	1,035

[1] Exclusive of Yukon and the Northwest Territories.

Deaths, by cause, first quarter, 1939

Cause of death	Canada [1] (first quarter)		Province								
	1938	1939	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	234	175		7	10	41	70	6	2	18	21
Cancer	2,908	3,044	22	165	120	802	1,141	226	168	145	255
Cerebral hemorrhage, cerebral embolism, and thrombosis	552	587	7	60	50	125	217	22	40	31	35
Diarrhea and enteritis	463	369	1	10	6	220	69	18	23	12	10
Diphtheria	123	104		7	12	60	6	3	14	2	
Diseases of the arteries	2,598	2,997	20	182	102	590	1,465	155	128	136	219
Diseases of the heart	4,812	5,045	39	287	190	1,175	2,216	269	232	267	370
Homicides	36	25		3		5	9		2	8	3
Influenza	1,074	2,012	28	199	127	798	592	85	65	90	28
Measles	102	61			3	37	15	1	3	2	
Nephritis	1,762	1,812	30	95	60	831	541	68	54	46	87
Pneumonia	2,612	2,620	45	218	161	782	871	143	113	155	187
Poliomyelitis	13	4				1	3				
Puerperal causes	252	244	5	14	16	89	68	16	17	9	10
Scarlet fever	78	68			4	22	26	2	7	6	1
Smallpox	1	1									1
Suicides	225	185	2	8		31	70	16	8	22	28
Tuberculosis	1,564	1,547	23	105	62	708	301	105	61	73	109
Typhoid and paratyphoid fever	60	38	1	1	1	21	4	3	1	4	2
Violent deaths	1,010	914	11	88	34	180	372	53	42	34	100
Other specified causes		7,982	88	461	405	2,636	2,562	447	459	446	478
Unspecified or ill-defined		163	11	13	42	64	12	6	2	6	7
Whooping cough	160	139	1	7	18	67	31	1	2	7	5

[1] Exclusive of Yukon and the Northwest Territories.

IRISH FREE STATE

Vital statistics—Quarter ended June 30, 1939.—The following vital statistics for the Irish Free State for the quarter ended June 30, 1939, are taken from the Quarterly Return of Marriages, Births, and Deaths, issued by the Registrar General and are provisional:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	3,593	4.9	Deaths from—Continued.		
Births	14,468	19.7	Influenza	205	0.3
Total deaths	10,383	14.2	Measles	46	
Deaths under 1 year of age	920	[1] 64	Puerperal sepsis	3	[1] 0.2
Deaths from.			Scarlet fever	11	
Cancer	892	1.2	Tuberculosis (all forms)	931	1.3
Diarrhea and enteritis (under 2 years)	109		Typhoid fever	16	
Diphtheria	40		Whooping cough	42	

[1] Per 1,000 live births.

ITALY

Communicable diseases—4 weeks ended June 18, 1939.—During the 4 weeks ended June 18, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	May 22–28	May 29–June 4	June 5–11	June 12–18
Anthrax	15	20	10	9
Cerebrospinal meningitis	33	32	25	22
Chickenpox	578	538	529	506
Diphtheria	404	435	385	400
Dysentery (amoebic)	5	13	24	23
Dysentery (bacillary)	2	6	4	3
Hookworm disease	47	36	52	45
Lethargic encephalitis	1	2	1	1
Measles	1,964	1,925	1,607	1,677
Mumps	281	377	251	270
Paratyphoid fever	51	59	62	51
Pellagra	153	40	58	25
Poliomyelitis	70	75	93	139
Puerperal fever	22	13	23	28
Scarlet fever	269	279	261	221
Typhoid fever	281	269	223	228
Undulant fever	187	158	159	179
Whooping cough	480	625	497	578

LATVIA

Notifiable diseases—April–June 1939.—During the months of April, May, and June 1939, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	April	May	June	Disease	April	May	June
Botulism		1	3	Poliomyelitis	4	6	7
Cerebrospinal meningitis	9	17	4	Puerperal septicemia	9	4	2
Diphtheria	100	93	83	Scarlet fever	238	294	216
Erysipelas	32	49	38	Tetanus	1	1	4
Influenza	524	133	81	Trachoma	42	28	65
Lead poisoning	2	1	2	Tuberculosis	227	210	337
Leprosy	1	1	3	Typhoid fever	50	50	52
Measles	2,654	3,530	2,042	Typhus fever	1		
Mumps	647	869	281	Whooping cough	92	64	83
Paratyphoid fever	4	7	29				

SWITZERLAND

Communicable diseases—June 1939.—During the month of June 1939, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Poliomyelitis	8
Chickenpox	196	Scarlet fever	842
Diphtheria	47	Trachoma	1
German measles	29	Tuberculosis	258
Influenza	22	Typhoid fever	2
Measles	56	Undulant fever	12
Mumps	120	Whooping cough	150
Paratyphoid fever	5		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of September 29, 1939, pages 1792–1806. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Shanghai.—During the week ended September 16, 1939, 93 cases of cholera were reported in Shanghai, China.

Typhus Fever

Mexico—Jalisco State—Guadalajara.—During the week ended September 9, 1939, one death from typhus fever was reported in Guadalajara, Jalisco State, Mexico.

Yellow Fever

Colombia—Antioquia Department—San Carlos.—On September 2, 1939, one death from yellow fever was reported in San Carlos, Antioquia Department, Colombia.

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Public Health Reports

VOLUME 54 OCTOBER 13, 1939 NUMBER 41

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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PREVALENCE OF POLIOMYELITIS

During the week ended October 7, 390 cases of poliomyelitis were reported in the United States, as compared with 469 cases during the preceding week, and a median of 290 cases for the corresponding week of the 5 years 1934-38. The gradual decrease which has been noted since the week ended September 16, when 501 cases were reported, continued during the current week. The States reporting 10 or more cases are given in the following table:

	Cases		Cases
New York	77	Minnesota	40
New York City	8	Minneapolis	13
New Jersey	10	Iowa	14
Pennsylvania	28	Texas	14
Philadelphia	15	Colorado	12
Ohio	12	Utah	10
Michigan	38	California	42
Wisconsin	10	Los Angeles	6

CULTIVATION OF PHASE I *H. PERTUSSIS* IN A SEMI-SYNTHETIC LIQUID MEDIUM

By J. W. Hornibrook, *Passed Assistant Surgeon, Division of Infectious Diseases, National Institute of Health, United States Public Health Service*

Most workers who have grown Phase I *H. pertussis* on other than Bordet-Gengou media have found it necessary to add blood or serum to obtain growth. Wollstein (*1*) could obtain growth only on B.-G. media, ascitic broth, rabbit serum agar, serum, or blood bouillon. Truschina, Pechletzkaja, and Murawjewa (*2*) used 10 percent human serum in broth. Teissier, Reilly, Rivalier, and Cambessedes (*3*) used blood gelatin. Mishulow, Mowery, and Scott (*4*) used chocolate agar and horse serum. Cruickshank and Freeman (*5*) used Wright's heart agar with proteose peptone and horse serum. Lwoff (*6*) states that *H. pertussis* will grow on peptone water. However, he does not state whether Phase I organisms were used and whether serial transfers were made to rule out the possibility of transfer of growth substances from the inoculum.

There is need for a liquid culture medium of simple composition which will sustain a heavy growth of Phase I organisms. This would

be helpful in providing large quantities of organisms, free from extraneous matter, for chemical studies. It would be useful for investigating the nature of any soluble antigen which may be evolved by the organism and, finally, it might open the way to a better method of preparing a vaccine.

It was first found that growth could be obtained in a 1 percent proteose peptone or hydrolyzed casein solution in buffered saline at pH 7.4, provided a cellophane sausage casing containing whole blood was suspended in the solution during the growth period. This medium produced a good growth but contained traces of unknown compounds contributed by the blood dialysate.

After further experimentation a medium was developed, containing known ingredients, consisting of inorganic salts, hydrolyzed casein, soluble starch, and either glutathione or cysteine. With the exception of the starch all of the ingredients are dialyzable. If it is desired to remove the unused starch when the growth has been completed this may be accomplished by the addition of a small amount of ptyalin. (Berkefeld filtered saliva, 0.5 cc. per 100 cc. of culture is satisfactory.) The action is completed in a few minutes at room temperature. After this step dialysis should remove all the original constituents of the medium.

Preparation of the medium.—The medium contains the following ingredients and they are added in the order given:

	Cc.
Distilled water	1,000
	Gm.
Hydrolyzed casein [1]	7.00
Sodium chloride	5.00
Potassium chloride	.20
Calcium chloride, anhydrous	.20
Magnesium chloride (6 H_2O)	.10
Sodium carbonate, anhydrous	.50
Potassium acid phosphate, monohydrated	.25
Soluble starch [2] (reagent)	1.00
Yeast extract (optional, see below) (*8*)	----

[1] Commercial casein is acid leached and alcohol extracted according to the method of McCollum, Simmonds, Shipley, and Park (Bull. Johns Hopkins Hosp., 33: 298 (1922)), and is hydrolyzed by the method of Berg and Rose (J. Biol. Chem., 82: 479 (1929)).

[2] The use of starch is not new. The Lederle Laboratories have been using it for some time in the cultivation of *H. pertussis*.

After the reaction has been adjusted to 7.4 the medium is autoclaved for 20 minutes at 20 pounds. On cooling, the reaction is readjusted and the medium filtered through paper. One hundred cc. quantities are then placed in Blake bottles and reautoclaved. Before inoculation 0.5 cc. of a 0.2 percent solution of either glutathione or cysteine is added. This solution must not be heated but is sterilized by Berkefeld filtration. The bottles are inoculated from a B.-G. slant, placed on their sides so as to allow a large surface exposed to the air, and incu-

bated at 37° C. Growth is complete in from 48 to 96 hours, depending upon the size of the inoculum. When growth is completed a preservative may be added if desired.

Effect of serial transfer on growth.—In order to determine if growth was due to the transfer of blood from the Bordet-Gengou slant with the inoculum and to determine if a change of phase took place in the new medium, the following experiment was carried out.

Four Blake bottles of medium were prepared as above (containing yeast extract). One loopful of organisms from a B.-G. slant was suspended in 5 cc. of saline. The first bottle was inoculated with 0.5 cc. of this suspension. When growth had taken place, 1 cc. was transferred to the second bottle, and so on. The results were as follows:

	Time required for heavy growth (hours)
Blake bottle No. 1	48
Blake bottle No. 2	72
Blake bottle No. 3	72
Blake bottle No. 4	72

Material from bottle No. 4 was centrifuged, the organisms washed once and agglutinated with Phase I antiserum. The titer was the same as with Phase I organisms from the same original source but transferred on B.-G. medium. The bacilli from the fourth bottle had the same morphology as Phase I organisms and were hemolytic when transferred to B.-G. medium. They would not grow when transferred to plain nutrient agar slants.

It would appear that growth does not depend upon transfer of growth promoting substances with the inoculum and that *H. pertussis* remains in Phase I for at least 4 transfers on the new medium.

Action of the organism on starch.—Since starch is necessary it would be interesting to know whether it is acted upon by the organism. The following experiment indicates that the starch is broken down. A 10-cc. quantity of media containing starch was divided into two equal parts. One was inoculated and both were placed in the incubator for 3 days. At the end of that time an equal amount of Gram's iodine was added to each and the two compared in the colorimeter. It was found that the color of the inoculated tube was less intense than that of the uninoculated tube and that the latter was blue while the inoculated tube was violet.

Factors involved in the growth of H. pertussis.—As a result of some preliminary experiments it was found that organic nitrogen was essential for growth. Tests indicated that hydrolyzed casein was a satisfactory source of nitrogen and had the advantage over peptone of being dialyzable.

Certain polysaccharides are also necessary for growth. Soluble starch is one of these. Another polysaccharide which may be used

in place of starch is Beta dextrin (*7*), obtained by the action of *B. macerans* on potato starch and purified by three recrystallizations. Alpha dextrin may also be used. (Our sample of Alpha dextrin was of doubtful purity.) Such substances as glycogen, saliva-hydrolyzed starch, commercial dextrin, glucose, lactose, maltose, celliobiose, glucosan, laevoglucosan, trihexosan, acacia, mucin, and agar cannot be used in place of starch.

Organic sulfur also proved to be essential for growth. This may be in the form of glutathione, cysteine, or cystine, but not methionine.

These three substances, namely, organic nitrogen as in amino acids, certain polysaccharides, and organic sulfur, are considered absolutely essential ingredients in this liquid medium in order to obtain a growth of *H. pertussis*.

In order to ascertain whether growth could be improved, tests were made by adding other substances to this basic medium and culturing under comparable conditions. It was found that blood serum, freshly hemolyzed red cells, whole blood dialysate, and an aqueous extract of dried brewers' yeast prepared according to the method of Lwoff and Lwoff (*8*) contain a growth-stimulating substance which, if added to the basic medium, will greatly increase growth. If the extraneous material which is thereby added is not considered objectionable, it is recommended that 0.5 cc. of the above yeast extract be added to each 100 cc. of the medium.

Other substances were also tested in a similar manner and were found to have no stimulating effect. The substances tested included vitamin B_6, Beta indole acetic acid, cevitamic acid, cholesterol, diphospho-pyridinenucleotid, filtrate factor, vitamin concentrate, glycerophosphate, hemin, lactoflavine, liver catalase (*9*), nicotinic acid, pimilic acid, sodium citrate, thiamin, thyroxin, triphospho-pyridinenucleotid, and tryptophane.

SUMMARY

1. The formula of a simplified, serum-free liquid medium is presented which supports a heavy growth of Phase I *H. pertussis*.

2. It has been demonstrated that, aside from organic nitrogen, two groups of substances are necessary for growth of Phase I *H. pertussis*: (a) Certain polysaccharides, and (b) sulfur-containing compounds such as glutathione or cysteine. An unknown substance present in yeast extract stimulates growth but is not essential.

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DEVELOPMENT AND GENETIC CHARACTERISTICS OF THE ADENOMATOUS STOMACH LESION IN STRAIN I MICE [1]

By H. B. Andervont, *Senior Biologist, United States Public Health Service*

The occurrence of a spontaneous stomach lesion in strain I mice has been reported previously (*1*), and in a more recent publication (*5*) the pathology of the lesion has been described. The gastric process is characterized by hyperplasia of the mucosa of the glandular portion of the stomach and is found in virtually all mice of the strain when they are 8 months of age. Progressive growth of the lesion is the chief cause of death in strain I animals, which are known to die at an early age. The reader is referred to an earlier paper (*5*) for a detailed description of the macroscopic and microscopic appearance of the lesion as well as its effect on the organism.

The appearance of the gastric process in a mouse 2½ months of age and the normal development of the process in animals over 6 months of age were described in the earlier report (*5*), but it was thought necessary to study the normal development of the growth in younger mice before beginning experimental procedures which may influence its course. Since the gastric process is known to occur in practically all mice of strain I, it was considered of interest to determine what genetic factors are involved.

In the experiments reported here the macroscopic appearance of the stomachs of strain I mice was used to trace the normal development in younger mice and to ascertain whether the lesion has a genetic basis. The process can be easily detected by macroscopic examination. In advanced cases the glandular portion of the stomach is enlarged and firm with nodular elevations beneath the serosa. When the stomach is opened, the lumen of the glandular portion is found to be reduced in caliber and the mucosa is thickened with coarse hypertrophied rugae. In the less advanced cases the lesion is not

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

so pronounced but is easily detected by comparing the stomachs of strain I mice with those of mice of other strains.

All the mice used in the investigation were maintained on a diet of Purina dog chow exclusively.

DEVELOPMENT OF LESION IN NORMAL STRAIN I MICE

To determine the development of the adenomatous lesion, litters of strain I mice were separated as to sex as soon as the nursing period was ended and each animal was numbered. When these mice were 2 months old, 10 animals (5 males and 5 females) were selected to be sacrificed at 1-month intervals. Each group of 10 was made up to include litter mates so far as possible and usually consisted of representatives of 2 or 3 litters. The procedure was followed over a period of 7 months, making a total of 8 groups of mice. In addition to these animals, other normal strain I mice of both sexes, ranging in age from 1 to 15 months, were used in the study.

Immediately after death of the animal the stomach was preserved by ligating the orifices, injecting 0.5 cc. of fixative into the lumen and placing the entire stomach in fixative. After hardening, the stomach was cut longitudinally, the esophageal and pyloric orifices bisected, one-half stained for histologic study and the other half kept for macroscopic observation. In this manner a complete series of gross and stained specimens was available.

Stomachs of strain I mice 1 or 2 months of age were normal in appearance, i. e., they were similar to those seen in mice of the same age belonging to other strains. Early lesions were seen in mice, especially males, 3 to 4 months of age and consisted of a few hyperplastic areas in the glandular mucosa of the greater curvature. The lesion developed progressively in all mice over 3 to 4 months of age and was pronounced in every 8-month-old animal.

A comparison of the stomachs obtained from male and female mice from 2 to 6 months old revealed that the lesion appeared earlier in the males. By the fourth month hyperplasia had occurred in practically every male animal while many females of the same age had normal stomachs. The lesion is obvious in virtually all 6-month-old animals of both sexes but is more pronounced in males, and this same order of susceptibility is maintained, on the average, throughout life. The difference in the degree of development in male and female mice is shown in figure 1. The reason why the lesion appears earlier and is more pronounced in males than in females is obscure.

GENETIC STUDIES

Routine autopsies performed in this laboratory during the past few years (*5*) have revealed a somewhat similar stomach lesion in a few old mice belonging to other inbred strains as well as in "stock" or

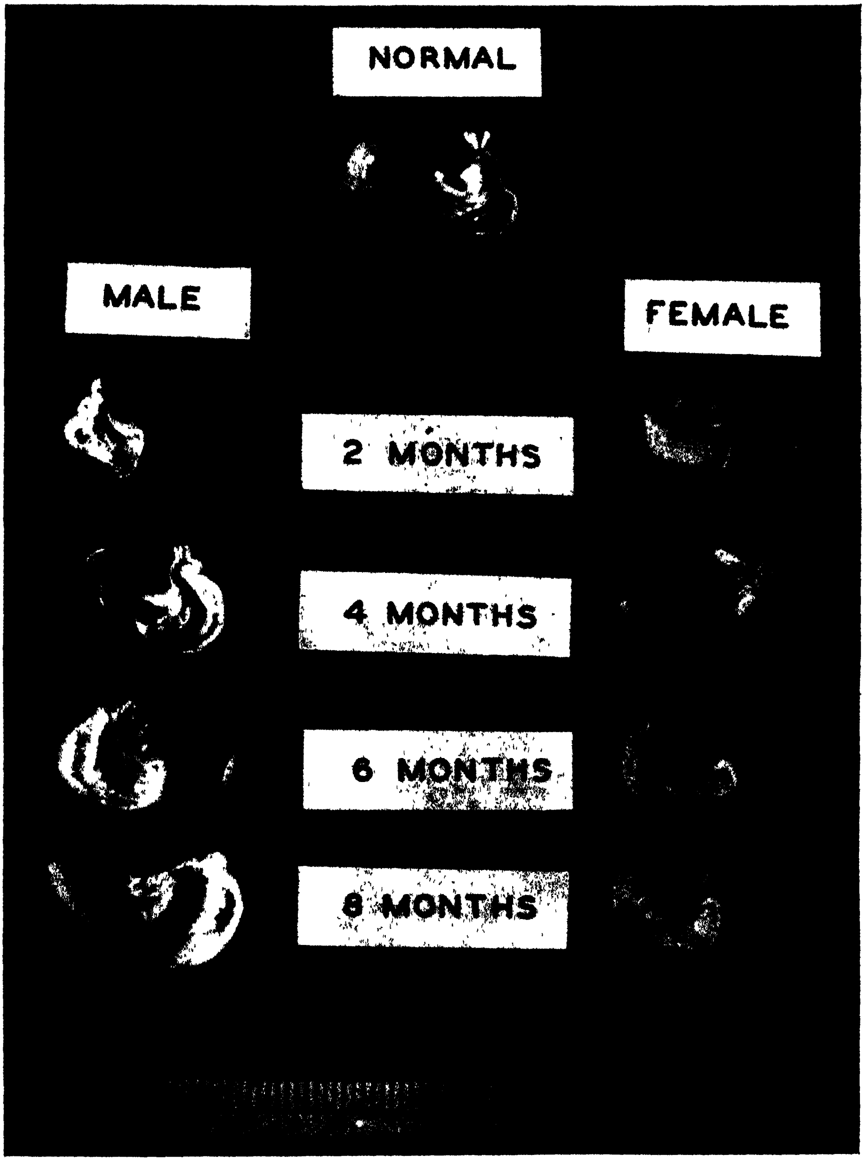

FIGURE 1.—Difference in degree of development of the spontaneous stomach lesion in male and female mice of strain I. Each specimen was prepared by injecting fixative into the lumen and placing the stomach in fixative. After hardening, the stomach was split longitudinally. The specimen at the top is from a male mouse of strain C, age 1 year, and is designated as a normal stomach. The other 8 specimens are stomachs from strain I mice At the age of 2 months both sexes have normal stomachs At the age of 4 months the stomach from the male shows hypertrophy of the glandular mucosa, while the stomach from the female is similar to the normal specimen. The lesion is seen in the stomachs of all strain I mice 6 or 8 months of age but is more pronounced in the specimens from the males. Actual size.

"market" mice, but these lesions were far less extensive than those occurring in younger mice of strain I. The occurrence of gastric hyperplasia in mice of other strains is of some significance for it shows that the tendency, at least, is not limited to strain I mice, and suggests that consistent inbreeding has produced, in strain I, a stock in which the tendency has become pronounced. The inbreeding of mice has resulted in the production of strains which are highly susceptible to the development of spontaneous breast cancer (*2*) and strains which show a high incidence of spontaneous pulmonary tumors. Furthermore, the susceptibility to spontaneous pulmonary growths is known to be inherited (*4*) as a dominant characteristic.

The high incidence of gastric lesions in strain I mice presents an opportunity to determine whether the lesion is inherited in accordance with genetic principles. Strain I mice were mated to strain C57 black animals to procure outcross mice for genetic studies. Mice of strain C57 black were selected because the lesion has not been seen in any member of the strain under 1 year of age and because the females take excellent care of their young.

During September 1937, reciprocal crosses were made between strain I and strain C57 black mice by mating 11 of the C57 black females to I males and by mating 9 strain I females to C57 black males. These mice are referred to as the F generation. The young were all black and consisted of 41 females and 32 males (from C57 black females mated to I males), and 31 females and 36 males (from I females mated to C57 black males). The 140 mice thus procured are designated as the F_1 hybrid generation.

Two of the strain I females, after having been bred to C57 black males, were mated to their brothers and 14 strain I mice (7 males and 7 females) were obtained. These animals were kept with the F_1 hybrid mice and are designated as normal strain I mice.

During January 1938, 14 females of the F_1 hybrid generation were mated to C57 black males and 14 additional females of the F_1 hybrid generation were mated to I males. The following numbers of mice were obtained from these matings: 34 females and 33 males from F_1 hybrid females $\times$ C57 black males; 49 females and 33 males from F_1 hybrid females $\times$ I males. The 77 mice obtained by mating F_1 hybrid females to C57 black males were all black and are called black backcross mice. The 82 mice born to F_1 hybrid mothers and strain I males had a variety of coat colors and are called I backcross mice.

Results in the F generation mice.—The 11 C57 black females died or were sacrificed at an average age of 14 months; none had any evidence of the stomach lesion. The 9 strain I females lived to an average age of 8.6 months and all had pronounced stomach lesions.

Results in the F_1 hybrid generation mice.—Of 132 mice of this group which were kept for one year and then killed, none had a stomach lesion.

During October 1938, all of the 14 normal strain I mice, which were then 8 to 8.5 months old, were sacrificed; all showed definite stomach lesions. At the same time 8 of the F_1 hybrid mice, which were 10.5 months of age, were killed. These animals had been born to the same mothers as were the normal I mice but had had a C57 black father. None had the stomach lesion.

The absence of the lesion in the F_1 hybrid generation reveals clearly that if the lesion has a genetic basis, it is inherited as a recessive characteristic. The result in the F_1 hybrids of this experiment is similar to the finding reported in an earlier publication (*3*). When strain I mice were mated to strain C_3H animals, none of the resultant hybrids developed a stomach lesion.

It is generally accepted that susceptibility to tumor growth is inherited as a dominant characteristic. The recessive nature of the stomach lesion, as reported here, suggests that it may not be a malignant growth. This postulation is supported by the histologic appearance of the lesion as well as by the absence of metastases in strain I mice exhibiting pronounced gastric hyperplasia (*5*).

Results in backcross mice.—All of the 77 black backcross mice were kept until they were 1 year of age and were then necropsied; all were free from the stomach lesion. This is further evidence that susceptibility to the lesion is inherited as a recessive characteristic.

The I backcross mice were sacrificed and necropsied when they were 1 year old. Some had stomach lesions comparable to those found in year-old strain I mice, some had normal stomachs, and many had a few hyperplastic areas in the glandular mucosa of the stomachs which were similar to those seen in 3- to 4-month-old strain I mice. It is obvious that such findings in year-old mice cannot be interpreted with certainty. However, the occurrence of definite stomach lesions in some of the I backcross animals is evidence that the lesion is inherited as a recessive characteristic, while the small degree of hyperplasia in the stomachs of others suggests that a number of factors are involved which may control the time of appearance of the lesion or its degree of development.

CONCLUSIONS

The adenomatous lesion of the stomach which occurs spontaneously in practically all adult mice of strain I appears earlier and is more pronounced in the male mice.

The susceptibility to the development of the lesion is inherited as a recessive characteristic, and a number of factors are involved.

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EFFECTS OF EXTRACTS OF HUMAN URINE ON TUMORS IN MICE[1]

By Floyd C. Turner, *Surgeon, United States Public Health Service*

Rhodenburg and Nagy (*1*) in 1937 described a method of extraction whereby a growth stimulating substance and a growth inhibiting substance were derived from human urines.[2] The growth stimulation and growth inhibition of these substances were measured by their effects on the rate of proliferation of a protozoan, *Colpidium campylum*, in culture medium.

The eight tests described here were conducted for the purpose of determining the effects of these substances on (*a*) transplanted, (*b*) spontaneous, and (*c*) chemically induced tumors in mice.

MATERIALS AND METHODS

The tests were divided into three types:

Type 1.—Mice were injected with a cancerigenic hydrocarbon, and then given daily injections of the urinary growth affecting substances. There were three tests in which 152 strain D (dilute brown) and 79 strain C_3H mice were utilized. Male mice were used in order that spontaneous mammary tumors would not be a complicating factor.

Type 2.—The growth affecting substances derived from urine were tested in mice bearing transplanted dermal sarcoma No. 37. There were three tests in 189 male and female strain ABC mice. As these were short duration experiments in young mice, spontaneous tumors were not encountered.

Type 3.—The growth affecting substances were fed to mice. All mice were strain C_3H. Eleven females had spontaneous mammary tumors. In another experiment 37 males had been injected with one

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

[2] Inasmuch as Rhodenburg and Nagy called these a "growth stimulating substance" and a "growth inhibiting substance," these terms are so used in this paper. However, it is possible that the physiological response obtained with these urinary fractions may not be due to specific growth factors.

dose of 1:2:5:6-dibenzanthracene prior to the feeding of the growth affecting substances.

A total of 468 mice were used in eight experiments. The controls showed the susceptibilities of these strains of mice to chemically induced tumors.

In extracting the urinary growth affecting substances, the methods of Rhodenburg and Nagy were closely followed. Nevertheless, different batches of material varied somewhat in physical properties. For example, while most of the batches of growth inhibiting substance resulted in a white powder, an occasional batch would be a light tan color. The batches of growth stimulating substance were uniformly a dark brown liquid, but, on storage, a precipitate settled out in some but not in others. Normal human urine was used.

The injections of cancerigenic hydrocarbons were all made in the right axillas of the mice, subcutaneously. The dose of 1:2:5:6-dibenzanthracene was 10 mg. of the crystals moistened with glycerine for injection in one test and 1 mg. in 0.25 cc. of lard in another test. The dose, per mouse, of 20-methylcholanthrene was 1 mg. in 0.25 cc. of lard. The injections of the urinary growth affecting substances were, unless otherwise stated, subcutaneous and as far away as practicable from the hydrocarbon, that is, in the left inguinal region. Daily doses, as used here, means daily except Sundays and holidays.

TYPE 1 TESTS

EXPERIMENT 1. DAILY DOSES OF URINARY GROWTH STIMULATING AND GROWTH INHIBITING SUBSTANCES INJECTED INTO MICE WHICH HAD RECEIVED ONE SUBCUTANEOUS INJECTION OF 1:2:5:6-DIBENZANTHRACENE

Seventy-two male strain D (dilute brown) mice 2½ months old were each injected subcutaneously in the right axillas, with a dose of 10 mg. of 1:2:5:6-dibenzanthracene moistened with glycerine. The mice were then divided into 5 groups. Group 1 received no other treatment. Group 2 received, on the same day, 0.25 cc. of a solution containing 1 cc. of growth stimulating substance in 1 cc. of distilled water. Group 3 received, subcutaneously in the left inguinal region, daily doses of 0.025 cc. of the above solution of growth stimulating substance. Group 4 received, subcutaneously in the left inguinal region, 1 dose of 0.025 cc. of a suspension containing 1 gm. of the growth inhibiting substance in 1 cc. of distilled water. Group 5 received daily doses of 0.0025 cc. of the above solution. The daily injections continued for 9 months. All mice died in 18 months or less.

Results.—At the end of the test several mice in each group had developed tumors at the site of injection of the 1:2:5:6-dibenzanthracene, with the exception of group 5 which had received daily injections of the growth inhibiting substance. One mouse in group 5, however,

had a tumor in the right inguinal lymph node, while the crystalline 1:2:5:6-dibenzanthracene was found *in situ* in the right axilla without tumor.

Calcific deposits were noted in the heart muscle and at the site of the dibenzanthracene injection in some of the mice in group 5.

TABLE 1.—*Experiment 1. Effects of substances derived from human urine on tumor formation induced by 1:2.5:6-dibenzanthracene subcutaneously*

Substance injected, in addition to 10 mg. 1 2 5 6-dibenzanthracene	Number of mice injected, Mar 10, 1937	Number of mice living, July 10, 1937	Number of mice developing tumors	Number of mice not developing tumors	Percent of mice living on July 10, 1937, which developed tumors
Group 1 Controls, 1 2 5 6-dibenzanthracene only	15	13	12	3	92
Group 2 One dose of urinary growth stimulating substance	12	12	10	2	83
Group 3. Daily doses of urinary growth stimulating substance for 9 months	15	13	10	5	77
Group 4 One dose of urinary growth inhibiting substance	15	14	11	4	78
Group 5 Daily doses of urinary growth inhibiting substance for 9 months	15	15	1	14	7

EXPERIMENT 2. DAILY DOSES OF URINARY DERIVATIVES INJECTED INTO MICE WHICH HAD RECEIVED 1 DOSE OF CANCERIGENIC HYDROCARBON SUBCUTANEOUSLY

Fifty-nine male strain C_3H mice, 2½ months old, were each injected in the right axillas with a dose of 1 mg. of 1:2:5:6-dibenzanthracene in 0.25 cc. of lard. They were divided into 2 groups of 20 and 1 group of 19 mice. Twenty other untreated C_3H male mice were set aside as controls, making 79 mice in the experiment. Group 1 consisted of untreated controls. Group 2 mice had received 1 dose of 1:2:5:6-dibenzanthracene subcutaneously and no other treatment. Group 3, consisting of 19 mice, had received 1:2:5:6-dibenzanthracene, 1 dose subcutaneously, and daily doses of urinary growth stimulating substance (0.25 cc. of 1 to 10 dilution). Group 4 had received 1 subcutaneous dose of 1:2:5:6-dibenzanthracene and daily doses (0.5 cc. of a 1 to 10 dilution) of urinary growth inhibiting substance. The daily injections were discontinued after 17 weeks because of extensive ulcerations at the site of injections in the group receiving the growth inhibiting substance. The ulcers healed and all test mice lived more than 5 months. Results are shown in table 2 and figure 1.

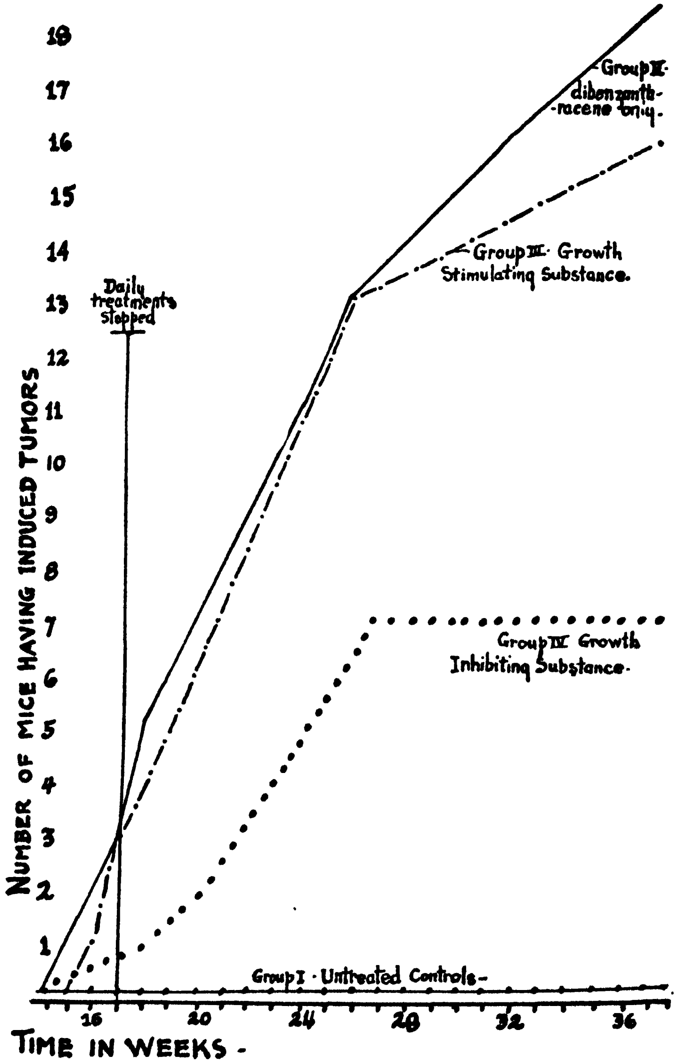

FIGURE 1.—Experiment 2. Time of onset of tumors induced by 1:2:5:6-dibenzanthracene in mice given daily doses of urinary growth affecting substances.

TABLE 2.—*Experiment 2. Effects of daily doses of substances derived from urine on tumor formation induced by subcutaneous injection of 1 mg. of 1:2:5:6-dibenzanthracene in lard*

Substance injected, in addition to 1 mg. 1:2:5:6-dibenzanthracene (controls untreated)	Number of mice injected, Mar. 28, 1938	Number of mice living, July 28, 1938	Number of mice developing tumor at site of dibenzanthracene	Number of mice not developing tumors	Percent of mice alive on July 28, 1938, which developed tumors
Group 1: Untreated controls, 20 mice	0	19	0	20	0
Group 2: 1:2:5:6-dibenzanthracene only	20	20	18	2	90
Group 3: Daily doses of urinary growth stimulating substance for 17 weeks	19	19	17	2	89
Group 4 Daily doses of urinary growth inhibiting substance for 17 weeks	20	20	7	13	35

EXPERIMENT 3. DAILY DOSES OF URINARY GROWTH AFFECTING SUBSTANCES INJECTED INTO STRAIN D (DILUTE BROWN) MICE WHICH HAD RECEIVED 1 DOSE OF METHYLCHOLANTHRENE

Twenty male strain D mice from 3 to 4 months old served as untreated controls (group 1). Sixty other similar mice each received 1 mg. of methylcholanthrene in 0.25 cc. of lard, subcutaneously in the right axillas on October 5, 1938. Twenty mice, group 2, received no other treatment. Group 3, 20 mice, received daily injections of 0.1 cc. of a 1 to 2 dilution of the urinary growth stimulating substance. Group 4, 20 mice, received daily injections of 0.2 cc. of a suspension of 1 gm. of urinary growth inhibiting substance in 4 cc. of distilled water. The daily injections were administered subcutaneously in the left inguinal region for 6½ months.

Results.—Group 1 developed 1 tumor, a spontaneous lymphoma; group 2 developed 13 tumors; group 3, 16 tumors, and group 4, which had received the inhibiting substance, developed 9 tumors (table 3). It is believed that different batches of the urinary extracts varied somewhat in potencies.

TABLE 3.—*Experiment 3. Effects of substances derived from urine upon tumor formation induced by methylcholanthrene*

Substance injected, in addition to 1 mg. 20-methylcholanthrene (controls untreated)	Number of mice injected, Oct. 5, 1938	Number of mice alive, Feb. 5, 1939	Number of mice developing tumors	Number of mice not developing tumors	Percent of mice alive on Feb. 5, 1939, which developed tumors
Group 1: Untreated controls. 20 mice	0	17	[1] 1	19	6
Group 2: Methylcholanthrene only	20	19	13	7	68
Group 3: Daily doses of urinary growth stimulating substance	20	20	16	4	80
Group 4: Daily doses of urinary growth inhibiting substance	20	19	9	11	47

[1] Lymphoma.

TABLE 4.—*Experiments 1, 2, and 3. Summary of three experiments in which 158 mice were injected with cancerigenic hydrocarbons (one dose), then given daily doses of growth affecting substances derived from human urine*

	Controls, cancerigenic hydrocarbon only		Cancerigenic hydrocarbon followed by daily injections of growth stimulating substance		Cancerigenic hydrocarbon followed by daily injections of growth inhibiting substance	
	Number of mice alive 4 months after injection of hydrocarbon	Number of mice which developed tumors	Number of mice alive 4 months after injection of hydrocarbon	Number of mice which developed tumors	Number of mice alive 4 months after injection of hydrocarbon	Number of mice which developed tumors
Experiment 1, strain D mice	13	12 (92%)	13	10 (80%)	15	1 (7%)
Experiment 2, strain C_3H mice	20	16 (80%)	19	17 (90%)	20	7 (35%)
Experiment 3, strain D mice	19	13 (68%)	20	16 (80%)	19	9 (47%)
Total	52	41 (av. 80%)	52	43 (av. 83%)	54	17 (av. 30%)

Fewer tumors developed in the mice which were given the urinary growth inhibiting substance.

TYPE 2 TESTS

EXPERIMENT 4. URINARY GROWTH AFFECTING SUBSTANCES ADMINISTERED TO MICE BEFORE AND AFTER TRANSPLANTATION OF SARCOMA 37

Sixty strain ABC mice of both sexes, 4 to 5 weeks old, were used in the test. They were divided into 3 groups of 20 mice each. On March 24, 1938, 20 mice were injected subcutaneously in the left inguinal region with 0.25 cc. of a 1 to 10 dilution of urinary growth stimulating substance. This same dose was repeated daily for 6 days. Then a mash of sarcoma 37 tumor tissue was injected dermally into the shaved abdomens of the mice, following which the same daily dose of urinary growth stimulating substance was administered for another 5 days. The same procedure was followed in a second group of 20 mice, except that a daily dose of 0.5 cc. of a 1 to 10 dilution of urinary growth inhibiting substance was administered. A third control group of 20 mice received only the transplanted tumor tissue on the sixth day of the test. Each of the 60 resulting tumors was measured daily for 11 days, then every second day until the mice died or the tumors regressed, a period of 1 month.

Results.—All of the tumors grew. On the twenty-second day after transplantation, the average maximum diameter of the tumors in the group receiving growth stimulating substance was 17 mm., that of the tumors in the group given growth inhibiting substance was 15.8 mm., and that of the tumors in the untreated control group, 18.8 mm. The final regression rate of 10 percent was roughly the same in all three groups.

EXPERIMENT 5. URINARY GROWTH INHIBITING SUBSTANCE ADMINISTERED TO MICE WITH TRANSPLANTED S-37 TUMORS

Thirty-six strain ABC mice of both sexes, 7 to 8 weeks old, were given dermal injections of S-37 tumor mash on September 30, 1938. They were then divided into 3 groups of 12 each. Group 1 was given daily intraperitoneal injections of 10 mg. of growth inhibiting substance in 0.1 cc. of distilled water. The second group received the same daily dose of growth inhibiting substance subcutaneously, at a distance from the tumor implantations. The injections were continued until 22 daily doses had been given to the mice of each group. The third group of 12 mice received the implantation of tumor tissue but no other treatment. The results of this experiment are shown in table 5. No striking effects were observed.

TABLE 5.—*Experiment 5. Daily doses of urinary growth inhibiting substance injected into mice with S-37 dermal tumors*

Group	Number of mice	Material injected	Route of injection	Number of daily doses	Condition of tumors after 27 days		
					Growing	Smaller	Regressed (Gone)
					Percent	*Percent*	*Percent*
1	12	Inhibiting substance	Intraperitoneal	22	59	8	33
2	12	do	Subcutaneous	22	59	25	16
3 (untreated controls)	12			None	77	8	15

EXPERIMENT 6

Urinary growth affecting substances were mixed with sarcoma 37 tumor mash and injected dermally into strain ABC mice. Physiological saline and broth were mixed with tumor mash and used for injecting controls. Ninety-three mice were tested. The test substances, the growth stimulating and growth inhibiting substances derived from urine, were poisonous to the cells of the tumor mash in proportion to the concentrations used. The regression rates were as great in the control groups as in the test groups.

Results of type 2 tests.—The slight inhibition of tumor growth observed in these experiments may have been a result of interference with normal systemic physiology.

TYPE 3 TESTS

EXPERIMENT 7. URINARY GROWTH INHIBITING SUBSTANCE FED TO C_3H MICE BEARING SPONTANEOUS MAMMARY TUMORS

This feeding test was started on October 24, 1938; 11 female strain C_3H mice, about 9 months old, each bearing one or more spontaneous mammary tumors, were fed in drinking water a 1 to 100 dilution of the growth inhibiting substance derived from human urine. The test

terminated on January 6, 1939. During the 10½ weeks of the test, the mice consumed about 3,900 cc. of the 1 to 100 dilution. All the tumors increased in size, being apparently unaffected by the treatment.

EXPERIMENT 8. URINARY GROWTH AFFECTING SUBSTANCES FED TO MICE INJECTED WITH 1.2:5:6-DIBENZANTHRACENE

The mice used in this experiment were strain C_3H males about 2½ months old. Each mouse received 1 mg. of 1:2:5:6-dibenzanthracene in 0.25 cc. of lard, subcutaneously in the right axillas, on April 14, 1938. The mice were then divided into 2 groups. Eighteen were fed a 1 to 100 dilution of urinary growth stimulating substance; 19 were fed a 1 to 100 dilution of urinary growth inhibiting substance. The feedings were given *ad libitum* in the drinking water for 8½ months. During the first month accurate amounts of the ingested materials were recorded. The first group consumed 32.2 gm. of the urinary growth stimulating substance in that period of time and the second group consumed 35.1 gm. of the urinary growth inhibiting substance. Sixteen (88 percent) of the 18 mice fed urinary growth stimulating substance developed tumors at the site of the injected hydrocarbon, while but 12 (63 percent) of the 19 mice fed the urinary growth inhibiting substance developed tumors. Ninety-three percent of the 20 controls which had received only the hydrocarbon developed tumors at the site of injection.

DISCUSSION

That there are growth controlling factors in the normal bodies of all living things is evident. Whether it be a mouse or an elephant, a bacterium or an oak tree, each has its predestined limitation of growth. In the healing of a wound, new tissue rapidly forms and yet, when the wound is healed, the growth of the tissue is stopped; there has been stimulation of growth and growth inhibition. Doubtless the process is an intricate biological process involving several factors. The tests described here were performed in an attempt to ascertain whether, by these crude methods, such substances could be found grossly present in a human waste product. Whether the meager results attained in the experiments on the growth of tumors were due to such a metabolic growth inhibiting factor, to an extraneous chemical compound attributable to the process of extraction of the urine which affected the tumor cells directly or through rendering the food less utilizable to the tumor cells, has not been determined.

Development of tumors induced by 10 mg. of 1:2:5:6-dibenzanthracene as crystals moistened with glycerine was inhibited to a greater extent than development of tumors induced by 1 mg. of methylcholanthrene in lard, in the same strain of mice.

If cancers are formed by the mutation of normal cells, the inhibitory action may be due to a specific interference with a chain of biological transformation processes necessary in the metamorphosis of normal cells to malignant cells. Whether in the chemical induction of tumors such a change has been prevented by maintenance of the chemical structures of the cell, the tissue fluids, or the intracellular enzymes, or by prevention of alteration of the chromosomes is not known. Methylcholanthrene (*2*) has been suspected of producing a deficiency in the sulfur-containing amino acids.

That the inhibition of the formation of tumors following injection of a cancerigenic chemical was not a result of the development of a systemic resistance to tumor formation in general was evidenced by the finding that transplanted sarcoma 37 grew in several strain D mice in which tumors had been prevented by long-continued daily injections of urinary growth inhibiting substance following the injection of methylcholanthrene, a cancer inducing agent.

SUMMARY

A growth inhibiting substance derived from human urine prevented, to a limited degree, the formation of tumors in mice following injection of cancerigenic chemicals, but the urinary derivative had little, if any, specific inhibiting effect on transplanted or spontaneous tumors in mice.

ACKNOWLEDGMENT

I am indebted to Mrs. Theresa Shovelton for technical assistance.

REFERENCES

(*1*) Rhodenburg, G. L., and Nagy, S. M.: Growth stimulating and inhibiting substances in human urine. Am. J. Cancer, **29**: 66 (1937).

(*2*) White, J., and White, A.: Inhibition of growth of rat by oral administration of methylcholanthrene. Proc. Soc. Exp. Biol. and Med., **39**: 529 (1938).

DEATHS DURING WEEK ENDED SEPTEMBER 23, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 23, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,620	[1] 7,321
Average for 3 prior years	[2] 7,457	
Total deaths, first 38 weeks of year	316,317	309,287
Deaths under 1 year of age	471	[1] 497
Average for 3 prior years	[2] 514	
Deaths under 1 year of age, first 38 weeks of year	19,080	20,084
Data from industrial insurance companies:		
Policies in force	66,671,692	68,268,220
Number of death claims	10,591	10,891
Death claims per 1,000 policies in force, annual rate	8.3	8.3
Death claims per 1,000 policies, first 38 weeks of year, annual rate	10.2	9.8

[1] Data for 87 cities.

[2] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 30, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median
NEW ENG.												
Maine	18	3	1	1	6	1	1	------	24	4	1	1
New Hampshire	0	0	0	0	------	------	------	------	0	0	0	1
Vermont	0	0	0	0	------	------	------	------	67	5	0	6
Massachusetts	7	6	3	6	------	------	------	------	29	25	52	12
Rhode Island	8	1	0	0	------	------	------	------	115	15	0	2
Connecticut	6	2	1	1	------	------	3	2	30	10	4	5
MID. ATL.												
New York	4	10	13	26	[1] 4	[1] 6	[1] 2	[1] 11	11	28	60	60
New Jersey	5	4	6	7	6	5	12	9	12	10	5	18
Pennsylvania [3]	8	16	14	28	------	------	------	------	12	23	46	46
E. NO. CEN.												
Ohio	21	27	32	33	11	14	------	15	8	11	23	23
Indiana [2]	13	9	29	29	1	1	21	15	6	4	2	8
Illinois [2]	9	13	26	35	4	6	12	9	5	7	22	22
Michigan [3]	5	5	11	13	8	8	------	------	15	14	52	20
Wisconsin	0	0	0	2	84	48	23	23	32	18	55	38
W. NO. CEN.												
Minnesota	8	4	11	8	6	3	5	------	12	6	37	10
Iowa	22	11	31	9	------	------	5	------	10	5	6	3
Missouri	5	4	25	38	------	------	11	28	5	4	3	15
North Dakota	22	3	3	2	102	14	5	------	7	1	63	4
South Dakota	8	1	1	1	------	------	2	------	23	3	10	2
Nebraska	15	4	7	6	------	------	------	------	0	0	2	2
Kansas	11	4	6	7	11	4	1	------	20	7	6	5

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 30, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	3	0	------	------	------	------	20	1	0	0
Maryland [3]	19	6	2	9	12	4	4	3	9	3	9	7
Dist. of Col.	8	1	4	10	16	2	2	------	8	1	3	3
Virginia [2]	116	62	50	39	60	32	75	------	7	4	6	6
West Virginia	24	9	21	34	22	8	12	11	5	2	5	6
North Carolina [3]	168	115	105	104	3	2	2	2	16	11	47	12
South Carolina [4]	112	41	43	23	437	160	240	142	3	1	3	1
Georgia [4]	63	38	37	47	8	5	55	------	2	1	10	0
Florida [4]	36	12	10	10	12	4	------	------	6	2	16	1
E. SO. CEN.												
Kentucky	42	24	43	43	7	4	25	2	30	17	12	12
Tennessee	46	26	34	43	53	30	34	13	7	4	2	3
Alabama [4]	69	39	78	48	12	7	28	9	11	6	7	7
Mississippi [3]	48	19	33	30	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	52	21	23	14	5	2	25	9	22	9	1	1
Louisiana [4]	31	13	14	14	5	2	5	3	0	0	22	3
Oklahoma	12	6	12	12	24	12	37	31	0	0	4	1
Texas [4]	17	21	43	40	56	67	108	45	57	69	13	10
MOUNTAIN												
Montana	0	0	0	0	------	------	4	6	75	8	21	5
Idaho	0	0	0	0	------	------	3	2	31	3	1	0
Wyoming	87	4	2	0	------	------	------	------	65	3	6	6
Colorado	24	5	25	10	63	13	------	------	39	8	7	6
New Mexico	37	3	3	2	12	1	------	------	0	0	3	3
Arizona [3]	25	2	2	2	564	46	16	16	12	1	3	3
Utah [3]	0	0	1	0	20	2	------	------	20	2	2	1
PACIFIC												
Washington	9	3	1	2	------	------	------	------	438	142	9	9
Oregon	15	3	4	0	35	7	7	13	70	14	8	8
California	7	9	40	29	4	5	15	22	59	72	130	47
Total	24	609	853	853	25	525	800	534	24	584	799	748
39 weeks	15	14,901	18,252	18,252	186	154,152	49,189	106,475	364	351,182	764,564	672,284

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	6	18	3	4	4
New Hampshire	0	0	0	0	0	0	0	0	0	0	3	3
Vermont	0	0	0	0	94	7	0	0	107	8	7	6
Massachusetts	0	0	1	1	5	4	2	2	39	33	40	59
Rhode Island	0	0	0	0	8	1	0	0	8	1	3	8
Connecticut	0	0	1	1	6	2	5	5	65	22	10	10
MID. ATL.												
New York	0.4	1	2	6	44	109	7	16	22	54	125	128
New Jersey	0	0	1	1	20	17	1	4	54	45	25	35
Pennsylvania [3]	0.5	1	2	4	18	36	3	4	76	150	71	149

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 30, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934-38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934-38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934-38, median
E. NO. CEN.												
Ohio	0.8	1	1	3	4	5	4	23	81	106	152	157
Indiana [2]	0	0	0	1	6	4	1	7	101	68	89	85
Illinois [2]	0.7	1	0	3	9	13	6	14	56	85	138	161
Michigan [3]	1.1	1	1	1	61	58	2	14	91	86	183	92
Wisconsin	0	0	0	1	14	8	0	4	120	68	80	80
W. NO. CEN.												
Minnesota	0	0	0	0	66	34	0	3	72	37	54	54
Iowa	0	0	0	1	32	16	1	3	75	37	25	33
Missouri	0	0	0	1	2.6	2	0	2	32	25	81	59
North Dakota	0	0	1	0	7	1	0	0	146	20	13	11
South Dakota	0	0	0	0	0	0	1	1	60	8	3	8
Nebraska	0	0	0	0	4	1	0	1	46	12	13	13
Kansas	2.8	1	0	0	11	4	0	4	156	56	70	40
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	59	3	2	2
Maryland [3]	0	0	3	3	6	2	1	5	77	25	8	28
Dist. of Columbia	0	0	0	0	16	2	0	1	40	6	8	8
Virginia [3]	7	4	0	1	6	3	1	1	67	36	37	34
West Virginia	8	3	1	1	0	0	1	2	94	35	48	57
North Carolina [3]	0	0	0	0	6	4	0	1	94	64	83	83
South Carolina [4]	2.7	1	0	0	14	5	1	0	25	9	13	8
Georgia [4]	0	0	0	1	1.7	1	0	0	30	18	23	23
Florida [4]	3	1	0	0	0	0	0	0	12	4	8	4
E. SO. CEN.												
Kentucky	3	2	0	4	12	7	0	2	90	52	71	57
Tennessee	1.8	1	0	1	0	0	0	3	78	44	49	40
Alabama [4]	0	0	3	2	0	0	4	1	56	32	30	23
Mississippi [3]	0	0	0	1	2.5	1	0	0	25	10	11	15
W. SO. CEN.												
Arkansas	0	0	0	0	5	2	0	1	35	14	9	9
Louisiana [4]	5	2	1	1	0	0	0	1	12	5	5	5
Oklahoma	0	0	1	1	6	3	2	1	26	13	20	14
Texas [4]	1.7	2	0	0	13	16	2	2	20	24	51	31
MOUNTAIN												
Montana	0	0	0	0	0	0	0	1	84	9	21	21
Idaho	0	0	0	0	20	2	0	0	10	1	7	9
Wyoming [6]	0	0	0	0	22	1	0	0	87	4	3	4
Colorado	0	0	0	0	63	13	0	1	91	19	19	19
New Mexico	25	2	0	0	124	10	0	0	12	1	4	6
Arizona [3]	0	0	0	0	25	2	0	0	25	2	3	5
Utah [3]	0	0	0	0	129	13	0	0	79	8	5	7
PACIFIC												
Washington	0	0	0	0	0	0	0	5	96	31	10	19
Oregon	0	0	0	1	15	3	0	3	45	9	23	23
California	0	0	1	1	47	57	7	26	70	85	111	111
Total	1	24	20	52	19	469	52	277	59	1,487	1,871	2,125
39 weeks	1.6	1,526	2,337	4,499	5	4,908	1,354	5,807	125	[5] 122,665	144,157	172,584

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept. 30, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934–38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	2	2	163	27	18
New Hampshire	0	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0	362	27	15
Massachusetts	0	0	0	0	0	0	2	3	75	64	78
Rhode Island	0	0	0	0	0	0	3	1	183	24	9
Connecticut	0	0	0	0	9	3	2	2	163	55	37
MID. ATL.											
New York	0	0	0	0	7	18	27	26	110	274	481
New Jersey	0	0	0	0	12	10	5	11	98	82	187
Pennsylvania [3]	0	0	0	0	10	19	17	34	158	311	186
E. NO. CEN.											
Ohio	0	0	1	0	18	24	17	35	141	184	228
Indiana [3]	0	0	2	0	16	11	17	9	101	68	18
Illinois [3]	0	0	0	1	38	58	29	29	103	157	334
Michigan [3]	0	0	1	0	2	2	4	11	89	84	271
Wisconsin	0	0	0	1	12	7	2	2	218	124	287
W. NO. CEN.											
Minnesota	0	0	2	2	140	72	4	4	134	69	45
Iowa	2	1	7	2	6	3	1	7	24	12	16
Missouri	0	0	0	0	17	13	9	17	30	23	19
North Dakota	7	1	0	3	22	3	1	1	73	10	22
South Dakota	8	1	0	0	15	2	3	2	23	3	1
Nebraska	4	1	0	0	4	1	0	0	4	1	15
Kansas	3	1	2	1	11	4	5	5	45	16	49
SO. ATL.											
Delaware	0	0	0	0	0	0	0	2	157	8	16
Maryland [3]	0	0	0	0	19	6	8	16	163	53	16
Dist. of Col.	0	0	0	0	8	1	5	2	137	17	17
Virginia [3]	0	0	0	0	43	23	19	20	30	16	53
West Virginia	19	7	0	0	40	15	15	24	19	7	29
North Carolina [3]	0	0	0	0	15	10	5	24	120	82	154
South Carolina [4]	0	0	0	0	38	14	15	15	36	13	70
Georgia [4]	0	0	0	0	23	14	10	19	33	20	7
Florida [4]	0	0	0	0	15	5	3	4	0	0	13
E. SO. CEN.											
Kentucky	0	0	0	1	42	24	10	26	90	52	25
Tennessee	0	0	0	0	18	10	8	28	30	17	36
Alabama [4]	2	1	1	0	5	3	4	20	97	55	20
Mississippi [3]	0	0	2	0	13	5	7	7	------	------	------
W. SO. CEN.											
Arkansas	0	0	0	0	40	16	10	10	0	0	6
Louisiana [4]	0	0	0	0	39	16	22	22	56	23	7
Oklahoma	0	0	2	0	22	11	5	12	10	5	7
Texas [4]	1	1	1	1	33	40	84	84	36	44	81
MOUNTAIN											
Montana	0	0	0	0	0	0	3	6	66	7	19
Idaho	0	0	0	0	10	1	1	4	0	0	6
Wyoming	0	0	0	0	0	0	0	1	44	2	3
Colorado	10	2	6	4	19	4	14	10	111	23	29
New Mexico	0	0	1	0	12	1	10	20	494	40	24
Arizona [3]	0	0	2	0	61	5	4	0	282	23	8
Utah [3]	0	0	0	0	0	0	0	0	407	41	31

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Sept 30, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934-38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases	1934-38, median	Sept. 30, 1939, rate	Sept. 30, 1939, cases	Oct. 1, 1938, cases
PACIFIC											
Washington	0	0	2	3	46	15	4	4	74	24	33
Oregon	5	1	4	0	30	6	1	4	159	32	9
California	2	2	2	0	2	3	20	13	89	109	105
Total	1	19	38	33	20	498	387	574	94	2,328	3,140
39 weeks	9	[5]8,813	12,932	6,253	10	10,160	11,273	11,766	147	141,753	164,595

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Sept. 30, 1939, 8 cases as follows: Pennsylvania, 1; Indiana, 1; Illinois, 1; Virginia, 2; North Carolina, 3.
[3] Period ended earlier than Saturday
[4] Typhus fever, week ended Sept. 30, 1939, 76 cases as follows: Kansas, 1; North Carolina, 1; South Carolina, 7; Georgia, 33; Florida, 5; Alabama, 10; Louisiana, 5; Texas, 14
[5] The total numbers of cases of smallpox reported for the first 37 and 38 weeks of 1939 were 8,763 and 8,704, respectively, with an average case rate of 9 in each instance.
[6] During the week ended Sept. 23, 1939, the number of cases of scarlet fever in Wyoming should have been 1, with a case rate of 22. The total for the week was 1,216 cases, with a rate of 48. The total number of cases for the first 38 weeks of the year was 121,178.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
May 1939										
Wisconsin	4	229		3,938	3		1	633	10	4
June 1939										
Puerto Rico	31	41	1,259	29	0		0	0	0	41
July 1939										
Wisconsin	3	51	2	471	2		2		2	4
August 1939										
Alaska	0	4		264	1		0	0	0	1
Arizona	20	46	2	13	4	7	10	9	1	16
California	88	49	41	493	4	8	272	232	21	55
Hawaii Territory	6	3		4	8		15	1	0	2
Illinois	59	14	139	60	4	3	40	222	21	190
Indiana	23	8	9	14	0		4	91	3	34
Nevada	0			9	0		2	1	0	1
Oregon	4	6	3	63	1		6	21	0	20
Utah	0	7		35	1		3	31	0	9
Virginia	85	108	33	79		9	6	49	0	89
Wisconsin	8	136	1	148	1		21	230	6	14

Summary of monthly reports from States—Continued

May 1939

	Cases
Wisconsin:	
Chickenpox	1,671
Encephalitis, epidemic or lethargic	2
German measles	63
Mumps	1,170
Septic sore throat	27
Undulant fever	8
Whooping cough	698

June 1939

	Cases
Puerto Rico:	
Chickenpox	46
Dysentery	14
Mumps	2
Ophthalmia neonatorum	4
Puerperal septicemia	2
Tetanus	8
Tetanus, infantile	3
Whooping cough	93

July 1939

	Cases
Wisconsin:	
Chickenpox	366
Encephalitis, epidemic or lethargic	2
German measles	26
Mumps	272
Septic sore throat	5
Tularaemia	1
Undulant fever	6
Whooping cough	803

August 1939

	Cases
Actinomycosis:	
Illinois	1
Chickenpox:	
Alaska	1
Arizona	11
California	272
Hawaii Territory	30
Illinois	132
Indiana	11
Nevada	2
Oregon	26
Utah	32
Virginia	19
Wisconsin	193
Conjunctivitis, infectious:	
Hawaii Territory	29
Dysentery:	
Arizona	172
California (amoebic)	29
California (bacillary)	74
Hawaii Territory (amoebic)	3
Illinois (amoebic)	8
Illinois (amoebic carriers)	82
Illinois (bacillary)	17

August 1939—Continued

	Cases
Dysentery—Continued.	
Oregon (bacillary)	1
Virginia (bacillary)	730
Encephalitis, epidemic or lethargic:	
Arizona	1
California	23
Illinois	7
Nevada	2
Virginia	1
Food poisoning:	
California	132
Illinois	2
German measles:	
Alaska	4
Arizona	1
California	47
Hawaii Territory	5
Illinois	10
Utah	11
Wisconsin	29
Granuloma, coccidioidal:	
California	5
Hookworm disease:	
Hawaii Territory	7
Impetigo contagiosa:	
Alaska	3
Hawaii Territory	17
Oregon	20
Jaundice (epidemic):	
California	7
Leprosy:	
California	1
Hawaii Territory	3
Illinois	1
Mumps:	
Arizona	41
California	596
Hawaii Territory	53
Illinois	93
Indiana	24
Oregon	30
Utah	123
Virginia	27
Wisconsin	213
Ophthalmia neonatorum:	
California	1
Illinois	1
Rabies in animals:	
California	49
Illinois	22
Indiana	44
Rabies in man:	
Illinois	2
Relapsing fever:	
California	8
Rocky Mountain spotted fever:	
Illinois	6
Indiana	6
Oregon	2
Virginia	9

August 1939—Continued

	Cases
Scabies:	
Oregon	17
Septic sore throat:	
California	14
Hawaii Territory	2
Illinois	24
Oregon	5
Utah	2
Virginia	45
Wisconsin	3
Tetanus:	
California	6
Hawaii Territory	2
Illinois	4
Virginia	1
Trachoma:	
Arizona	63
California	10
Hawaii Territory	3
Illinois	40
Indiana	6
Oregon	2
Utah	3
Wisconsin	2
Trichinosis:	
California	4
Utah	1
Tularaemia:	
California	2
Illinois	9
Nevada	1
Oregon	4
Utah	9
Virginia	5
Wisconsin	1
Typhus fever:	
California	2
Hawaii Territory	3
Virginia	1
Undulant fever:	
Arizona	7
California	39
Illinois	22
Indiana	10
Nevada	1
Oregon	2
Utah	3
Virginia	1
Wisconsin	15
Vincent's infection:	
Illinois	14
Oregon	7
Whooping cough:	
Arizona	114
California	530
Hawaii Territory	244
Illinois	1,199
Indiana	234
Nevada	4
Oregon	67
Utah	274
Virginia	337
Wisconsin	759

WEEKLY REPORTS FROM CITIES

City reports for week ended September 23, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	135	60	15	141	324	429	2	333	80	1,031	
Current week [1]	85	48	13	133	238	314	0	288	61	951	
Maine:											
Portland	0		0	0	0	0	0	0	0	1	22
New Hampshire:											
Concord	0		0	0	2	0	0	0	0	0	10
Manchester	0		0	0	1	0	0	0	0	0	29
Nashua	0		0	0	0	0	0	0	0	3	6
Vermont:											
Barre											
Burlington	0		0	0	0	0	0	0	0	0	10
Rutland	0		0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	0		0	2	8	12	0	3	0	31	196
Fall River	2		0	0	2	0	0	1	0	2	23
Springfield	0		0	0	0	0	0	1	1	6	34
Worcester	2		0	0	5	5	0	0	0	7	46
Rhode Island:											
Providence	0	2	0	13	0	0	0	0	0	6	52
Connecticut:											
Bridgeport	1		0	0	0	0	0	0	1	0	27
Hartford	0		0	0	1	0	0	1	0	18	34
New Haven	0		1	0	2	4	0	1	2	6	44
New York:											
Buffalo	0		0	0	2	3	0	2	0	8	123
New York	10	3	0	6	43	23	0	79	7	118	1,351
Rochester	0		0	0	2	0	0	1	0	3	58
Syracuse	0		0	0	2	3	0	0	0	44	38
New Jersey:											
Camden	0		0	0	1	12	0	0	0	2	22
Newark	0	1	0	0	1	4	0	7	7	31	65
Trenton	0		0	0	2	0	0	4	1	1	36
Pennsylvania:											
Philadelphia	1	8	2	6	14	18	0	18	0	125	412
Pittsburgh	1	2	1	4	7	16	0	5	0	16	155
Reading	0		0	0	0	0	0	2	0	2	22
Scranton	0			0		2	0		0	0	
Ohio:											
Cincinnati	9		0	0	1	2	0	2	0	9	130
Cleveland	0	6	1	5	5	11	0	7	0	42	160
Columbus	1		0	1	2	2	0	2	0	7	81
Toledo	0	1	0	0	8	2	0	5	0	9	76
Indiana:											
Anderson	0		0	0	0	0	0	0	0	5	4
Fort Wayne	0		0	0	1	1	0	1	0	0	25
Indianapolis	5		1	1	7	11	0	3	1	19	99
Muncie	0		0	0	2	4	0	0	0	2	8
South Bend	0		0	2	0	0	0	0	0	11	15
Terre Haute	3		0	0	1	2	0	0	0	0	20
Illinois:											
Alton	0		0	0	0	0	0	0	0	3	6
Chicago	7	3	0	4	20	83	0	20	5	96	629
Elgin	0		0	0	0	2	0	0	0	1	7
Moline	0		0	0	0	0	0	0	0	0	8
Springfield	0		0	0	0	0	0	1	0	1	26
Michigan:											
Detroit	2		0	4	6	22	0	12	1	41	199
Flint	0		1	0	4	3	0	0	0	3	28
Grand Rapids	0		0	4	0	2	0	0	2	5	28
Wisconsin:											
Kenosha	0		0	0	0	0	0	0	0	2	2
Madison	0		0	0	1	0	0	0	0	0	24
Milwaukee	0		0	0	7	15	0	2	0	22	90
Racine	0		0	0	0	1	0	0	0	11	11
Superior	0		0	0	0	4	0	0	0	0	10

[1] Figures for Barre estimated; report not received.

City reports for week ended September 23, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	1	0	1	0	2	0	3	24
Minneapolis	2	------	0	4	5	9	0	1	4	26	119
St. Paul	0	------	0	2	1	3	0	0	0	36	48
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	2	0	------	0	1	------
Des Moines	0	------	0	0	0	6	0	0	0	0	39
Sioux City	1	------	------	0	------	1	0	------	0	5	------
Waterloo	3	------	------	0	------	1	0	------	0	1	------
Missouri:											
Kansas City	0	------	0	2	4	5	0	3	4	2	90
St. Joseph	0	------	0	0	0	0	0	0	0	0	25
St. Louis	1	------	0	2	0	6	0	4	4	13	204
North Dakota:											
Fargo	0	------	0	0	2	0	0	0	0	5	11
Grand Forks	0	------	------	0	------	1	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	1	------	------	0	------	0	1	------	0	0	------
Sioux Falls	1	------	0	0	0	1	0	0	0	0	9
Nebraska:											
Omaha	2	------	0	0	4	1	0	0	0	3	49
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	4
Topeka	0	------	0	0	0	3	0	1	0	1	16
Wichita	0	------	0	0	1	2	0	0	0	4	25
Delaware:											
Wilmington	1	------	0	1	3	2	0	0	0	3	32
Maryland:											
Baltimore	1	1	0	4	7	7	0	10	0	43	162
Cumberland	0	------	0	0	1	2	0	0	0	0	9
Frederick	0	------	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	7	------	0	1	4	5	0	8	0	30	131
Virginia:											
Lynchburg	3	------	0	1	1	1	0	0	0	3	8
Norfolk	0	------	0	0	3	0	0	0	0	1	28
Richmond	1	------	0	0	2	3	0	3	1	0	43
Roanoke	0	------	0	0	0	0	0	1	0	0	9
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	2	0	13
Huntington	1	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	1	0	2	1	0	------	0	0	18
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	1	------	0	0	0	0	0	0	0	0	4
Wilmington	1	------	0	0	1	0	0	0	0	0	10
Winston-Salem	1	------	0	0	0	4	0	1	0	0	11
South Carolina:											
Charleston	0	------	0	0	0	0	0	0	1	0	9
Florence	1	------	0	0	2	0	0	0	0	3	11
Greenville	0	------	0	0	0	0	0	0	0	0	4
Georgia:											
Atlanta	4	4	0	0	1	6	0	4	0	0	80
Brunswick	0	------	0	0	0	0	0	1	0	0	2
Savannah	0	15	0	0	0	1	0	1	0	0	21
Florida:											
Miami	1	------	0	0	0	1	0	0	1	4	21
Tampa	1	------	0	0	2	0	0	0	1	0	17
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	7
Covington	0	------	0	0	0	2	0	1	0	5	9
Lexington	0	------	0	0	1	0	0	0	0	2	3
Louisville	0	------	0	1	2	7	0	3	1	21	83
Tennessee:											
Knoxville	1	------	0	0	0	1	0	1	4	1	16
Memphis	0	------	0	2	2	1	0	5	1	12	86
Nashville	2	------	0	0	5	5	0	3	2	0	50
Alabama:											
Birmingham	2	1	1	0	0	2	0	5	2	0	63
Mobile	0	------	1	0	0	1	0	1	0	0	29
Montgomery	5	------	------	0	------	0	0	------	0	2	------
Arkansas:											
Fort Smith	1	------	------	0	------	0	0	------	2	0	------
Little Rock	0	------	0	0	0	0	0	3	0	0	------

City reports for week ended September 23, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
New Orleans	1	-----	0	0	8	1	0	10	5	10	122
Shreveport	0	------	0	0	2	0	0	0	1	0	33
Oklahoma:											
Oklahoma City	2	------	0	0	2	0	0	1	1	0	37
Tulsa	0	------	--------	0	-------	1	0	-------	0	0	--------
Texas:											
Dallas	3	------	0	0	1	2	0	0	0	5	42
Forth Worth	0	------	0	0	1	1	0	0	2	3	25
Galveston	0	------	0	0	1	0	0	1	1	0	15
Houston	0	------	0	0	3	1	0	3	2	1	65
San Antonio	0	------	0	1	4	1	0	6	0	0	61
Montana:											
Billings	0	------	1	0	0	0	0	0	1	2	8
Great Falls	0	------	0	0	0	2	0	0	0	1	6
Helena	0	------	0	2	0	0	0	0	0	0	3
Missoula	0	------	0	0	0	0	0	0	0	0	3
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	2
Colorado:											
Denver	2	------	2	2	4	2	0	2	0	4	71
Pueblo	0	------	0	0	0	0	0	1	0	1	7
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	8
Utah:											
Salt Lake City	0	------	0	0	0	0	0	1	0	18	22
Washington:											
Seattle	0	------	0	8	3	1	0	2	0	2	78
Spokane	1	------	0	3	0	2	0	1	0	0	28
Tacoma	0	------	0	33	2	1	0	1	0	0	27
Oregon:											
Portland	0	------	0	1	4	5	0	0	0	6	73
Salem	0	------	--------	0	-------	0	0	-------	0	0	--------
California:											
Los Angeles	4	6	0	9	8	13	0	14	0	23	329
Sacramento	0	------	0	2	1	5	0	2	1	1	35
San Francisco	0	1	0	1	4	3	0	12	0	3	225

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Vermont:			
Burlington	0	0	2
Massachusetts:			
Boston	0	0	2
Fall River	0	0	1
Connecticut:			
Bridgeport	0	0	1
New York:			
Buffalo	0	0	48
New York	0	0	22
Rochester	0	0	6
New Jersey:			
Camden	0	0	14
Newark	0	0	2
Trenton	0	0	3
Pennsylvania:			
Philadelphia	0	0	24
Pittsburgh	0	0	9
Ohio:			
Cleveland	0	0	2
Toledo	0	0	1
Indiana:			
Fort Wayne	0	0	1
Illinois:			
Chicago	0	0	6
Michigan:			
Detroit	0	0	39
Flint	0	0	1
Wisconsin:			
Milwaukee	0	0	4
Minnesota:			
Minneapolis	0	0	26
St. Paul	0	0	1
Missouri:			
St. Louis	0	0	1
Maryland:			
Baltimore	0	0	1
District of Columbia:			
Washington	0	0	2
Virginia:			
Norfolk	0	0	2
Georgia:			
Savannah	0	0	1
Oklahoma:			
Oklahoma City	0	0	1
Utah:			
Salt Lake City	0	0	1
California:			
Los Angeles	0	0	7
Sacramento	0	0	2

Encephalitis, epidemic or lethargic.—Cases: New York, 5; St. Louis, 3; Topeka, 1.
Pellagra.—Cases: St. Paul, 2 (imported); Atlanta, 1; Savannah, 2; New Orleans, 1; Los Angeles, 1.
Typhus fever.—Cases: New York, 2; Charleston, S. C., 2; Atlanta, 2; Savannah, 5; Miami, 1; Tampa, 1; Birmingham, 1; Dallas, 3; Fort Worth, 1; Galveston, 1; Houston, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 16, 1939.—During the week ended September 16, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	Onta-rio	Mani-toba	Sas-katch-ewan	Al-berta	British Colum-bia	Total
Cerebrospinal meningitis				1	1					2
Chickenpox				4	32	4	6	3	11	60
Diphtheria		1	2	36	1	4		1		45
Dysentery				6	2				3	11
Influenza		13			3					16
Lethargic encephalitis				1					1	2
Measles		1	2	31	43	2			4	83
Mumps				9	12	7		1	10	39
Pneumonia		1			15				4	20
Poliomyelitis				4	13					17
Scarlet fever		3		19	70	14	1	9	2	118
Trachoma									5	5
Tuberculosis	1	1	15	31	58	5		1		112
Typhoid and paratyphoid fever			1	19	5	3		4	1	33
Whooping cough		10	6	70	69	35	32	6	12	240

DENMARK

Notifiable diseases—April–June 1939.—During the months of April, May, and June 1939, cases of certain notifiable diseases were reported in Denmark as follows:

Disease	April	May	June
Cerebrospinal meningitis	7	7	6
Chickenpox	1,162	958	759
Diphtheria	69	66	60
Dysentery	13	9	32
Epidemic encephalitis	4	1	
Erysipelas	186	184	171
Gastroenteritis, infectious	2,315	2,354	2,576
German measles	182	146	151
Gonorrhea	543	573	735
Influenza	15,056	7,054	3,800
Lymphogranuloma			1
Malaria		2	
Measles	1,419	1,570	1,237
Mumps	223	210	145
Paratyphoid fever	4	8	15
Poliomyelitis	1	4	1
Puerperal fever	19	14	19
Scarlet fever	397	768	444
Syphilis	32	35	35
Tetanus, neonatorum	1	5	3
Typhoid fever		1	4
Undulant fever	45	46	67
Weil's disease	2		2
Whooping cough	3,360	3,934	3,863

FINLAND

Communicable diseases—August 1939.—During the month of August 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	144	Poliomyelitis	5
Dysentery	6	Scarlet fever	228
Influenza	409	Typhoid fever	10
Lethargic encephalitis	1	Undulant fever	1
Paratyphoid fever	68		

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended July 1, 1939.—During the 13 weeks ended July 1, 1939, cases of certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	10,007	Puerperal pyrexia	2,552
Dysentery	430	Scarlet fever	21,126
Ophthalmia neonatorum	1,320	Typhoid fever	299
Pneumonia	11,014		

England and Wales—Vital statistics—Second quarter 1939.—During the second quarter ended June 30, 1939, 164,401 live births and 120,433 deaths were registered in England and Wales. The following statistics were taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General, and are provisional:

Birth and death rates in England and Wales, quarter ended June 30, 1939

Annual rates per 1,000 population:	
Live births	16.0
Stillbirths	.61
Deaths, all causes	11.7
Deaths under 1 year of age	[1] 48
Deaths from:	
Diarrhea and enteritis (under 2 years of age)	[1] 4.3
Diphtheria	.04
Influenza	.15
Measles	.01
Scarlet fever	.01
Whooping cough	.04

[1] Per 1,000 live births.

SWEDEN

Notifiable diseases—July 1939.—During the month of July 1939, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Poliomyelitis	16
Diphtheria	21	Scarlet fever	2,669
Dysentery	107	Syphilis	30
Epidemic encephalitis	1	Typhoid fever	9
Gonorrhea	1,138	Undulant fever	8
Paratyphoid fever	17	Weil's disease	2

SWITZERLAND

Communicable diseases—July 1939.—During the month of July 1939, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Paratyphoid fever	15
Chickenpox	160	Poliomyelitis	33
Diphtheria	61	Scarlet fever	250
German measles	10	Tuberculosis	269
Influenza	1	Typhoid fever	9
Measles	46	Undulant fever	11
Mumps	81	Whooping cough	187

YUGOSLAVIA

Communicable diseases—4 weeks ended August 13, 1939.—During the 4 weeks ended August 13, 1939, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	119	9	Poliomyelitis	25	
Cerebrospinal meningitis	30	9	Scarlet fever	151	
Diphtheria and croup	467	38	Sepsis	8	5
Dysentery	213	18	Tetanus	68	18
Erysipelas	132	8	Typhoid fever	305	24
Favus	8		Typhus fever	9	
Paratyphoid fever	49	2			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of September 29, 1939, pages 1792–1806 A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Afghanistan—Kandahar Province.—For the period August 2 to 11, 1939, 101 cases of cholera with 45 deaths were reported in Kandahar Province, Afghanistan.

China.—During the week ended September 23, 1939, cholera was reported in China as follows: Hong Kong, 18 cases; Macao, 21 cases; Shanghai, 71 cases. During the week ended September 30, 1939, 3 cases of cholera were reported in Tsinan, China.

X

Public Health Reports

VOLUME 54 OCTOBER 20, 1939 NUMBER 42

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE * 1798 *

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

During the week ended October 14, 1939, 375 cases of poliomyelitis were reported as compared with 391 for the preceding week and with 263 for the corresponding median week of the 1934–38 period.

This is the fourth consecutive week which has shown a decrease in cases since the peak week of 501 cases for the week ended September 16. There is no indication of the appearance of an epidemic in any one State, but rather a decrease is noted in most of the States which have been reporting the highest number of cases. The present trend is in accordance with the usual expectancy for this season of the year; consequently this series of notes on "Prevalence of Poliomyelitis" will be discontinued with this issue.

NATIONAL CANCER INSTITUTE BUILDING COMPLETED

The new National Cancer Institute Building at Bethesda, Md., near Washington, D. C., was turned over to the Surgeon General of the United States Public Health Service by the Procurement Division of the Treasury Department on September 26, 1939. The building is located on a 15-acre tract of land donated for this purpose, and it adjoins the officers' living quarters and other buildings of the National Institute of Health. The building, consisting of three floors and two basements, will house both the scientific laboratories and the administrative offices of the National Cancer Institute.

The Cancer Investigations Station of the Institute at Gibbs Memorial Laboratory, Cambridge, Mass., has been closed, and the 25 members of the staff are being transferred to Bethesda. One cancer research fellow stationed in Rochester, N. Y., is also being transferred.

Under the direction of the Surgeon General of the Public Health Service, the work of the enlarged Cancer Institute will be administered by Dr. L. R. Thompson, Director of the National Institute of Health, Dr. Carl Voegtlin, Chief of the Cancer Institute, Dr. R. R. Spencer, Executive Assistant, and Dr. Ludvig Hektoen, Executive Director of the National Advisory Cancer Council.

DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, SECOND QUARTER AND FIRST HALF OF 1939[1]

By William M. Gafafer, *Senior Statistician, United States Public Health Service*

The material presented in this paper is based on periodic reports on disabling sickness and nonindustrial injuries from industrial plants located in Pennsylvania, Illinois, Massachusetts, Connecticut, New York, Ohio, Maine, South Dakota, New Jersey, and Canada. About 170,000 workers are covered, representing the male memberships of mutual sick benefit associations, group insurance plans, and company relief departments. The data presented deal with the frequency of sickness and nonindustrial injuries causing disability lasting more than one week.

SECOND QUARTER AND FIRST HALF OF 1939

A comparison of the frequency rates for the second quarters of 1939 and 1938, as presented in table 1, shows the principal difference to be associated with influenza and grippe, the frequency for 1939 being almost twice that for 1938. While the excess is not so great as that presented by the first quarters of the same years, it is sufficiently large to be reflected in the excess for all respiratory diseases and for all sickness.

The results of combining the experience of the first and second quarters are also shown in table 1. It will be observed that in a comparison of the rates for the first halves of 1939 and 1938 influenza and grippe plays an important part in the increase in the rate for the respiratory diseases as a group, and in the rate for all sickness.

FIRST HALVES OF THE YEARS 1930–39

An examination of the frequency rates for the different causes and cause groups for the first halves of the years 1930–39 revealed the behavior of the nonrespiratory diseases as a group and diseases of the nervous system (neuralgia, neuritis, and sciatica excepted) to be of particular interest. Table 2 and figure 1 show the rates for these two groups of diseases during this period.

Nonrespiratory diseases.—The frequency rates for this group of diseases for the first halves of the 10 years 1930–39 fluctuate about a mean annual rate of 46.0 cases per 1,000 males, with a lower limit of 41.8 in 1934 and an upper limit of 51.5 in 1930, the rate for 1939 (43.7) exceeding only the minimum rate given by 1934. The upper half of figure 1 shows graphically the rates for the 10-year period. It will be observed that a downward trend is in evidence which, while not spectacular, is of sufficient magnitude to arrest attention.

[1] From the Division of Industrial Hygiene, National Institute of Health, Washington, D. C. For the first quarter of 1939, see Public Health Reports for Aug. 25, 1939 (54:1554–1556).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the second quarter of 1939 compared with the second quarter of 1938, and the first half of 1939 compared with the first halves of the years 1934–38, inclusive* [1]

Cause (Numbers in parentheses are disease title numbers from the International List of the Causes of Death, 1929)	Annual number of cases per 1,000 males				
	Second quarter		First half		
	1939	1938	1939	1938	1934–38
Sickness and nonindustrial injuries [2]	81.5	76.9	103.2	88.2	99.6
Nonindustrial injuries (163–198)	9.5	10.4	9.5	10.6	10.9
Sickness [2]	72.0	66.5	93.7	77.6	88.7
Respiratory diseases	29.6	22.2	47.7	30.8	40.4
Influenza and grippe (11)	13.0	7.4	26.5	12.1	20.5
Bronchitis, acute and chronic (106)	3.3	3.1	4.9	4.7	5.0
Diseases of the pharynx and tonsils (115a)	5.2	4.9	5.4	5.2	5.6
Pneumonia, all forms (107–109)	3.3	1.8	4.0	2.5	3.1
Tuberculosis of the respiratory system (23)	.7	1.1	.7	1.0	.9
Other respiratory diseases (104, 105, 110–114)	4.1	3.9	6.2	5.3	5.3
Nonrespiratory diseases	40.3	42.8	43.7	44.9	45.8
Diseases of the digestive system	12.7	13.8	13.4	13.6	13.8
Diseases of the stomach, except cancer (117, 118)	3.6	4.3	3.6	4.1	3.9
Diarrhea and enteritis (120)	1.1	.9	1.1	.8	1.0
Appendicitis (121)	3.8	4.2	4.2	4.3	4.4
Hernia (122a)	1.7	1.9	1.5	1.8	1.7
Other digestive diseases (115b, 116, 122b–129)	2.5	2.5	3.0	2.6	2.8
Nondigestive diseases	27.6	29.0	30.3	31.3	32.0
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.1	3.8	4.6	4.3	4.2
Other genitourinary diseases (133–138)	2.0	2.2	2.2	2.4	2.5
Neuralgia, neuritis, sciatica (87a)	2.0	1.8	2.2	2.3	2.4
Neurasthenia and the like (part of 87b)	.9	.9	1.0	1.3	1.3
Other diseases of the nervous system (78–85, part of 87b)	1.1	1.0	1.0	1.0	1.0
Rheumatism, acute and chronic (56, 57)	3.7	4.0	4.1	4.2	4.6
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.3	2.8	2.7	2.8	3.0
Diseases of the skin (151–153)	2.2	2.7	2.5	2.9	2.7
Infectious and parasitic diseases (1–10, 12–22, 24–33, 36–44)	2.3	2.5	2.6	2.6	3.3
All other diseases (45–55, 58–77, 88, 89, 100, 101, 103, 154–156a, 157, 162)	7.0	7.3	7.4	7.5	7.0
Ill-defined and unknown causes (200)	2.1	1.5	2.3	1.9	2.5
Average number of males covered in the record	170,689	166,435	170,609	169,346	154,445
Number of organizations	26	26	26	26	

[1] In 1939 and 1938 the same organizations are included; the rates for the first halves of the years 1934–38, however, are based on records from the same 26 organizations and some additional reporting organizations.
[2] Exclusive of disability from the venereal diseases and a few numerically unimportant causes of disability.

TABLE 2.—*Frequency of disabling cases of nonrespiratory diseases, and diseases of the nervous system (except neuralgia, neuritis, and sciatica), lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, the first halves of 1930 to 1939, inclusive* [1]

Cause	Annual number of cases per 1,000 men for the first half of the year									
	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Nonrespiratory diseases	51.5	48.4	49.3	44.4	41.8	44.0	46.1	46.2	44.9	43.7
Diseases of the nervous system except neuralgia, neuritis, and sciatica	2.5	3.0	2.5	2.3	2.3	2.5	2.3	2.1	2.3	2.0

[1] The data are from table 1 and from the earlier papers of the present series. See PUBLIC HEALTH REPORTS for July 7, 1933; Sept. 29, 1933; Oct. 19, 1934; Nov. 15, 1935; Dec. 4, 1936; Oct. 29, 1937; and Oct. 28, 1938.

Diseases of the nervous system.—The rates for "neurasthenia and the like" and "other diseases of the nervous system" have been combined for the first halves of the years 1930–39 and are given in table 2. The lower half of figure 1 shows the frequencies graphically. It will be seen that the mean annual rate is 2.4 cases per 1,000 males. The maximum (3.0) occurred in 1931 and the minimum (2.0) during the first half of 1939. The downward trend of the rates over the 10-year period is of more than ordinary interest.

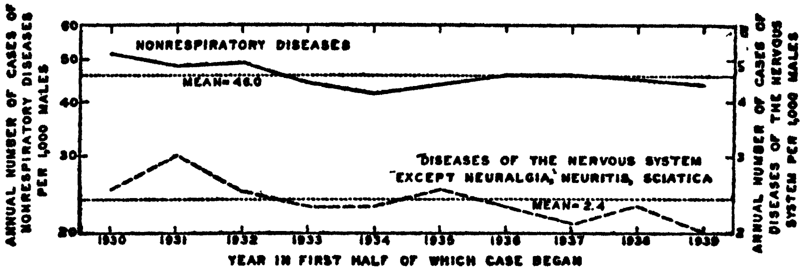

FIGURE 1.—Frequency (logarithmic) of disability lasting 8 consecutive calendar days or longer caused by nonrespiratory diseases, and diseases of the nervous system (except neuralgia, neuritis, and sciatica) for the first halves of 1930–39, inclusive. (Male morbidity experience of industrial companies which reported their cases to the United States Public Health Service.)

STUDIES IN CHEMOTHERAPY [1]

X. Colorimetric Tests for Aromatic Hydroxylamines and for Further Oxidation Products of Aromatic Amines. Their Demonstration in the Urine Following Sulfanilamide Administration

By SANFORD M. ROSENTHAL, *Senior Pharmacologist*, and HUGO BAUER, *Research Associate, Division of Pharmacology, National Institute of Health, United States Public Health Service*

While the major part of the sulfanilamide administered to animals or man can be recovered in the urine in its free or acetylated form, the

[1] The preceding papers of the series are as follows:

I. The action of sodium formaldehyde sulphoxylate in bacterial infections. By Sanford M Rosenthal, Pub. Health Rep., 49: 908 (1934). (Reprint No. 1638).

II Chemotherapy of experimental pneumococcus infections. By Sanford M. Rosenthal Pub Health Rep., 52: 48 (1937) (Reprint No. 1790).

III. The effect of p-aminobenzene sulphonamide on pneumococci *in vitro*. By Sanford M. Rosenthal. Pub. Health Rep., 52: 192 (1937). (Reprint No. 1802.)

IV. Comparative studies of sulphonamide compounds in experimental pneumococcus, streptococcus, and meningococcus infections. By Sanford M. Rosenthal, Hugo Bauer, and Sara E. Branham Pub. Health Rep. 52: 662 (1937). (Reprint No. 1825)

V. Sulphanilamide, serum, and combined drug and serum therapy in experimental meningococcus and pneumococcus infections in mice. By Sara E. Branham and Sanford M Rosenthal Pub. Health Rep., 52: 685 (1937). (Reprint No. 1826)

VI. The chemotherapy of choriomeningitis virus infection in mice with sulphonamide compounds. By Sanford M. Rosenthal, Jerald G. Wooley, and Hugo Bauer. Pub. Health Rep., 52: 1211 (1937). (Reprint No. 1854.)

VII. Some new sulfur compounds active against bacterial infections. By Hugo Bauer and Sanford M. Rosenthal. Pub. Health Rep., 53: 40 (1938). (Reprint No 1898.)

VIII. Some toxic effects of repeated administration of sulfanilamide and sulfanilyl sulfanilamide ("disulfanilamide") to rabbits and chickens. By Sanford M. Rosenthal. Pub. Health Rep., 54: 95 (1939). (Reprint No. 2026.)

IX. Antibacterial action of some aromatic arsenic, sulfur, and nitro compounds. By Sanford M. Rosenthal, Hugo Bauer, and Elias Elvove. Pub. Health Rep., 54: 1317 (1939).

possibility still exists that a small part of the drug is further changed in the body. The relatively weak action of sulfanilamide on organisms *in vitro* has led Levaditi (*1*) and Mayer (*2, 3*) to postulate such a change as involved in the mechanism of therapeutic action.

Mayer has studied the various oxidation products of the amino group, including the 4-hydroxylamino, azo, azoxy, 4-nitroso, and 4-nitrobenzene sulfonamide. In his experiments the hydroxylamino derivative was 100 times as active as sulfanilamide in the test tube but less active therapeutically. The nitro derivative was more active but also more toxic than sulfanilamide in therapeutic tests. Upon the basis of these results Mayer advanced the hypothesis that the slow liberation of the hydroxylamine derivative was involved in the therapeutic action of sulfanilamide. It would be formed in the body more readily from the nitro than from the aminobenzene sulfonamide. More recent work has also suggested the importance of nitro groups (*4, 5*). The feeble therapeutic action of the hydroxylamine derivative is explained by Mayer as due to its instability, and rapid breakdown following its injection. Marshall (*6*) has confirmed the increased activity of p-hydroxylaminobenzene sulfonamide *in vitro*.

The problem was approached in another way by Locke, Main, Shinn, and Mellon (*7, 8*) who demonstrated that the anticatalase activity of sulfanilamide was greatly increased by oxidation of the amino group. They demonstrated *in vitro* that inhibition of catalase brought about the accumulation of peroxides in the bacterial cultures and they explain the bacteriostatic action of the drug on this basis. The hydroxylamines have been shown to be highly active as inhibitors of catalase.

It thus becomes of importance to determine whether any of the sulfanilamide is oxidized in its passage through the body. The detection of oxidation products of the amino group of sulfanilamide by reduction methods was unsatisfactory because the small percentages which might be present were obscured by the large amounts of sulfanilamide, and also because the hydroxylamine derivative reacts somewhat to diazotization and cannot be readily differentiated from free sulfanilamide on the basis of the diazo reaction.

In order to detect oxidation products it was necessary to find a method which would eliminate from the reaction the large amount of free sulfanilamide present in the body fluids. Because of its possible physiological significance we were particularly interested in the hydroxylamine derivative.

Bamberger (*15*) has shown that nitrous acid acts upon phenyl hydroxylamine in the following manner:

$$(1)\ R.NHOH + HNO_2 = R.\underset{\displaystyle |\atop \displaystyle NO}{N}.OH + H_2O$$

$$(2)\ R.\underset{\displaystyle |\atop \displaystyle NO}{N}.OH + HNO_2 = R.N{=}N.NO_3 + H_2O$$

In the first stage of this reaction phenyl nitrosohydroxylamine is formed. A second molecule of nitrous acid gives rise to benzene diazonium nitrate. We have found that this same reaction occurs when the 4-hydroxylaminobenzoic acid, $HOHN.C_6H_4.COOH$, or 4-hydroxylaminobenzene sulfonamide, $HOHN.C_6H_4.SO_2NH_2$, is used. In both cases a diazo compound is formed which yields an intense color with the usual coupling reagents.

An attempt was made to keep any free sulfanilamide or other aromatic amine present from taking part in the diazo reaction. This was readily accomplished by preliminary acetylation carried out by shaking the solution with acetic anhydride. The amino groups acetylated in this manner will not be susceptible to diazotization.

Oxidation products which are not acetylated can be reduced to amino groups and estimated colorimetrically by the usual diazotization methods. The problem was further simplified when it was found that while acetylation of dilute solutions of sulfanilamide by treatment with acetic anhydride abolished the diazo reaction, similar treatment of 4-hydroxylaminobenzene sulfonamide or 4-hydroxylaminobenzoic acid caused them to react more promptly to diazotization. Dilute aqueous solutions of these hydroxylamine compounds (0.1 to 1 mg. percent) under the conditions of our experiments react slowly and irregularly to diazotization,[2] and, when ammonium sulfamate is used to destroy the excess of nitrous acid, only slight color is produced by them. However, when acted upon by acetic anhydride the diazo reaction occurs promptly. This is brought about specifically by the anhydride, for equal amounts of glacial acetic acid do not produce this effect. The chemical basis for this effect requires further investigation. This action of acetic anhydride, which forms the principle of the test for aromatic hydroxylamines, was entirely unexpected; all of the evidence so far obtained indicates the specificity of this reaction.

Another characteristic shown by these hydroxylamine derivatives was that in spite of the fact that treatment with acetic anhydride

[2] 4-Hydroxylaminobenzoic acid and one preparation of 4-hydroxylaminobenzene sulfonamide reacted slowly, while another preparation reacted more promptly

accelerates the diazo reaction, this treatment abolishes the positive reaction to Ehrlich's p-dimethylaminobenzaldehyde reagent.

A further characteristic of the aromatic hydroxylamines which we have observed by means of the above test is their extreme sensitivity to alkali. Dilute solutions in acid titrated with sodium hydroxide, with phenolphthalein as an indicator, will be largely decomposed as a result of this treatment. Likewise the addition of a drop of dilute NaOH to an aqueous solution will promptly cause darkening of the solution and abolish the color reactions. However, when sodium bicarbonate is employed instead of sodium hydroxide very little destruction of the hydroxylamine results.

TEST FOR AROMATIC HYDROXYLAMINES

To carry out tests upon solutions containing sulfanilamide or related aromatic compounds containing a free amino group, the solution is made neutral to litmus with acetic acid or sodium bicarbonate (acetylation will not occur in the presence of strong mineral acids) and diluted so that 50 cc. contains not more than 1 to 4 mg. of total sulfanilamide. To 50 cc. in a small flask is added 1 cc. of acetic anhydride and the solution thoroughly mixed for 1 minute. Care must be taken that all parts of the solution (including that around the stopper) are acted upon by the acetic anhydride. For the estimation of sulfanilamide or other amino compounds under comparable conditions, 1 cc. of glacial acetic acid is used in place of acetic anhydride. The solution is permitted to stand for 30 minutes after the addition of acetic anhydride. To 10 cc. is now added 0.4 cc. of normal HCl (3.65 percent) and diazotization carried out by Marshall's (*9*) method:

One cc. of 0.1 percent sodium nitrite, mix and wait 3 minutes.

One cc. of 0.5 percent ammonium sulfamate, mix and wait 2 minutes. We have found the sulfamate essential in our procedure.

Five cc. of 0.4 percent alcoholic solution of dimethyl alpha-naphthylamine, wait 5 to 60 minutes and read in a colorimeter against suitable standards.

One cc. of 0.1 percent aqueous N-(1-naphthyl) ethylenediamine dihydrochloride has been used instead of the alpha-naphthylamine, as recently described by Bratton and Marshall (*10*). It has been satisfactory with the exception that slightly more color is at times produced in control samples.

Up to the present the procedure has been applied chiefly to urines containing sulfanilamide and the following standards and controls have been employed:

(1) A control solution containing the urine obtained before sulfanilamide administration, diluted 1 to 50 or 1 to 100.

(2) Fifty cc. of this solution plus 1 to 4 mg. of sulfanilamide (from solution freshly prepared or kept on ice).

(3) Three standards consisting of solution (2), to which are added 0.05 mg., 0.1 mg., and 0.25 mg. of p-hydroxylaminobenzene sulfonamide or p-hydroxylaminobenzoic acid.[3]

These solutions were treated in the same manner as the unknowns.

TEST FOR FURTHER OXIDATION PRODUCTS (HYDROXYLAMINO TO NITRO DERIVATIVES INCLUSIVE)

To 20 cc. (or other aliquot) of the solutions which have stood with acetic anhydride for 30 minutes, but to which HCl has not been added, approximately 0.5 gm. of powdered zinc metal (zinc dust) is added in a large test tube, and the tube immersed in boiling water for 10 minutes. It is then cooled, made up to volume and filtered. To 10 cc. of the filtrate 0.4 cc. of N/1HCl is added, and diazotization carried out as described above.

This procedure as it stands is only qualitative. While good recovery of 4-nitrobenzene sulfonamide, 4-nitro- and 4-nitrosobenzoic acid was obtained, only partial recovery occurred with 4,4′-azoxy- and 4,4′-azobenzoic acid. Also at times increase in the amount of color given by the hydroxylamino derivatives was noted as a result of this treatment, and a slight amount of color frequently resulted in the sulfanilamide-containing controls, presumably as a result of hydrolysis of the acetylated compound. Another difficulty was that the color given by the urines under test was often difficult to match with the standards.

RESULTS IN AQUEOUS SOLUTIONS

The procedure for aromatic hydroxylamines gave no color, or only traces of color, with the following compounds in final concentration up to 8 mg. percent in aqueous solution:

Sulfanilamide, acetyl sulfanilamide, 4-nitrobenzene sulfonamide, sulfapyridine (2-sulfanilyl aminopyridine), sulfanilic acid, atoxyl, aniline, p-phenylenediamine, 4-aminophenol, 4-aminobenzoic acid, 4,4′-azobenzoic acid, 4,4′-azoxybenzoic acid, 4-nitrosobenzoic acid, 4-nitrobenzoic acid, hydroxylamine hydrochloride ($NH_2OH.HCl$).

4-4′-Diaminodiphenylsulfone was not completely acetylated by this procedure and gave considerable color both to diazotization and to Ehrlich's aldehyde reagent. To get complete acetylation of this compound it was found necessary to add acetic anhydride in two stages. To 50 cc. of a solution containing 5 mg. or less of 4,4′-diaminodiphenylsulfone 1 cc. of acetic anhydride is added and let stand 30 minutes. Five cc. of this solution is diluted to 50 cc. and the procedure repeated. By this method a negative diazo reaction may be obtained.

[3] p-Hydroxylaminobenzoic acid and p-hydroxylaminobenzene sulfonamide were prepared by reduction of the corresponding nitro compounds according to the method of E. Bamberger and F. L. Pyman (Ber. d. Deutsch. Chem. Ges., 42:230 (1909)).

Two samples of 4-hydroxylaminobenzene sulfonamide gave 60 and 63 percent of the color when compared with 4-hydroxylaminobenzoic acid (theoretical, on a molar basis=81 percent), but the colors were of slightly different shade. Whether these lower values are due to differences in chromogenic properties or to impurities in the former compound remains to be determined.

REDUCTION OF 4-NITROSOBENZOIC ACID BY CYSTEINE AND ASCORBIC ACID

When tests for hydroxylamine were carried out in urines to which the above compounds were added it was found that results similar to those in aqueous solutions were obtained, with the exception of 4-nitrosobenzoic acid. This compound reacted negatively in aqueous solutions but gave a positive reaction when added to freshly collected samples of urine. It was found that the addition of ascorbic acid to dilute aqueous solutions of this compound caused a prompt and almost complete reduction to the hydroxylamine; no aminobenzoic acid was detected (table 1). When cysteine or glutathione was added to 4-nitrosobenzoic acid the reduction was partially to the hydroxylamine and partially to the amine. It is, therefore, seen that the positive reaction which occurs when the nitroso compound is added to urine is attributable to reduction by the ascorbic acid present.

TABLE 1.—*Reduction of 4-nitrosobenzoic acid by ascorbic acid, by cysteine, and by glutathione solutions at room temperature for 30 minutes. Comparisons made with standard solutions of 4-aminobenzoic acid and 4-hydroxylaminobenzoic acid treated similarly. Percentages calculated on a basis of molecular weight. 0.8 cc. of N/1 HCl needed in carrying out diazo tests because of buffer present*

	Percent reduced to 4-aminobenzoic acid	Percent reduced to 4-hydroxylaminobenzoic acid
0.1 mg. 4-nitrosobenzoic acid 2.0 cc. phosphate buffer pH 7.4 1.0 mg. ascorbic acid, made up to 10 cc. in water	[1] Trace	91
As above, with 1.0 mg. cysteine hydrochloride	[1] 33	68
As above, with 1.0 mg. SH glutathione	[1] 34	65

[1] Probably excessive because the hydroxylamine present gives some color.

TESTS UPON BLOOD

Most of the protein precipitants were found unsatisfactory for the extraction of the aromatic hydroxylamines from the blood. It was also discovered that with the acid precipitants the hydroxylamine was being destroyed by the sodium hydroxide used to neutralize the solution. Trichloracetic acid was the most satisfactory precipitant, and when neutralization was carried out with sodium bicarbonate

from one-half to two-thirds of the added hydroxylamine could be recovered from blood serum.

Mayer (*3*) has shown that 4-hydroxylaminobenzene sulfonamide rapidly oxidizes hemoglobin to methemoglobin, the hydroxylamine being reduced to the amine during the process. Heubner (*11*), however, states that azoxybenzol is formed from the interaction of hemoglobin with β-phenyl hydroxylamine. In accordance with this it has not been possible to recover any added hydroxylamine from whole blood. However, it is possible to add the hydroxylamine to oxalated whole blood or plasma and to obtain partial recovery from the plasma if care is taken to avoid hemolysis and if tests are performed within a short time after the addition.

Two cc. of plasma from oxalated blood, as free as possible from hemolysis, are measured into a large test tube and mixed with 13 cc. of water; 5 cc. of 20 percent trichloracetic acid are added and mixed. The filtrate is carefully neutralized with powdered sodium bicarbonate; tests are then carried out as described above.

PRELIMINARY TESTS UPON ANIMALS FOLLOWING THE ORAL ADMINISTRATION OF SULFANILAMIDE

Catheterized samples of urine were made slightly acid with 10 percent acetic acid. When collected from animals kept in metabolism cages enough acetic acid was placed in the receptacle to insure an acid reaction.

Tests have been carried out upon human beings, dogs, rabbits, and rats. Oxidation products of sulfanilamide have been detected in all the urines which we have studied.

Results are shown in tables 2, 3, 4, and 5. It is of interest that the dog, in which acetylation of sulfanilamide does not occur, and the rat, in which there were only small percentages of acetylation in our experiments, gave lower values for hydroxylamine excretion than man and the rabbit, in which high percentages of acetyl sulfanilamide appear in the urine. The significance of this observation is not known. Confirmatory evidence that we are dealing with the hydroxylamine derivative in the urine was found in the behavior towards Ehrlich's dimethylaminobenzaldehyde reagent and in the sensitivity towards alkali of the compound giving the color reaction. However, the substance responsible for the color test in the urine is much more stable than aqueous solutions of the hydroxylamines. It was found that certain constituents of the urine, notably ascorbic acid and sulfhydryl compounds, markedly stabilize solutions of the hydroxylamines.

Table 2.—*Presence in the urine of 3 rabbits of a hydroxylamine derivative of sulfanilamide following the oral administration of 1.5 gm. of sulfanilamide in 100 cc. of water*

Rabbit weight (kilo)	Time after drug (hours)	Urine				Blood plasma	
		Volume (cc.)	Free sulfanilamide (mg.)	Total sulfanilamide (mg.)	Hydroxylamine sulfanilamide (mg.)[1]	Free sulfanilamide (mg. percent)	Hydroxylamine sulfanilamide
2.8	2	30	30	60	0.45	---------	---------
	4	93	93	177	2.14	---------	---------
	6	25	87	188	2.4	---------	---------
2.65	2	52	52	78	1.0	---------	---------
	4	45	45	95	2.1	---------	---------
	6	28	56	126	2.8	---------	---------
2.5	2	21	35	---------	2.1	25	0
	4	20	30	---------	2.4	20	0
	6	---------	---------	---------	---------	15	0

[1] In these experiments 4-hydroxylaminobenzoic acid was used as a standard. The values are only approximate, as the samples of 4-hydroxylaminobenzene sulfonamide so far prepared have yielded colors 60 to 63 percent lower than the above standard.

Table 3.—*Presence in the urine of dogs of only small amounts of hydroxylamine derivative following the oral administration of sulfanilamide*

Dog weight (kilo)	Oral dose of sulfanilamide (gm.)	Time after drug (hours)	Urine			Blood plasma	
			Volume (cc.)	Sulfanilamide (mg.)	Hydroxylamine sulfanilamide (mg.)	Sulfanilamide (mg. percent)	Hydroxylamine sulfanilamide
20	5.0	2	100	250	Trace	---------	---------
	---------	4	227	1,135	Trace	---------	---------
	---------	6	43	800	1.5	---------	---------
	---------	24	[1] 155	1,550	Trace	---------	---------
11.9	6.0	2	220	2[illegible]0	Neg.	40	Neg.
	---------	4	115	690	Large trace	33	Neg.
	---------	6	35	350	4.9	33	Neg.

[1] Obtained by catheter. Reaction alkaline. No urine voided during night.

Table 4.—*Aromatic hydroxylamine in the urine of rats following 1.2 gm. per kilo of sulfanilamide orally. Groups of 2 rats kept in small metabolism cages*

Rats weight (gm.)	Time after drug (hours)	Urine				Blood plasma	
		Volume (cc.)	Free sulfanilamide (mg.)	Total sulfanilamide (mg.)	Hydroxylamine sulfanilamide (mg.)	Free sulfanilamide (mg. percent)	Hydroxylamine sulfanilamide
250	2	12.5	43	43	Trace	---------	---------
230	4	7	29.4	35	0.35	---------	---------
	6	3	25	28.5	.6	---------	---------
	24	55	220	214.5	1.92	---------	---------
240	2	12	26.0	28.3	Trace	---------	---------
230	4	6.5	37.2	47.3	.32	---------	---------
	6	4.5	26.6	34.2	.45	---------	---------
	24	45	171	225	1.8	---------	---------
240	2	10	26.6	26.6	Trace	---------	---------
260	4	6	36	41.3	.42	---------	---------
	6	5.5	44	49	.55	30	Neg.

TABLE 5.—*Hydroxylamine derivative in single specimen of urine from afebrile patients (gonorrhea) on sulfanilamide therapy. (Obtained through the courtesy of Dr. P. J. McNamara of the U. S. Naval Hospital)*

Patient	Sulfanilamide therapy oral (gm.)	Urine	
		Free sulfanilamide (mg. percent)	Hydroxylamine sulfanilamide (mg. percent)[1]
Mart	2.66 for 20 days	100	1.25
Gor	4.0 for 17 days	100	3.5
	2.66 for 6 days		
Spg	4.5 for 2 days	300	10
	8.0 for 2 days		
Pot	4.5 for 2 days	75	1.2
	8.0 for 3 days		
	5.3 for 1 day		
	No drug for 2 days		
Huf	2.66 for 6 days	90	1.75

[1] 4-Hydroxylaminobenzoic acid was used as standard.

Qualitative tests for further oxidation products in the urine have shown little or none in man and in the rabbit, but in the dog and rat positive evidence of their presence was found, particularly at later intervals (6 to 24 hours) after the administration of sulfanilamide.

We have so far been unable to detect either hydroxylamines or further oxidation products in the oxalated blood plasma of the rabbit, rat, or dog. Whether or not this is a result of technical difficulties remains to be determined.

DISCUSSION

The reduction of aromatic nitro compounds to amino compounds by the body is well known. Amino compounds are demonstrable in the urine following the administration of nitrobenzene derivatives.[4]

In spite of the importance in therapeutics of aminobenzene derivatives, little is known concerning the oxidation of the amino group in the body. Heubner and Schwedtke (*11*) have suggested that aniline is oxidized to p-aminophenol, with p-phenylhydroxylamine as a probable intermediate. The only actual demonstration of an oxidation product of the aromatic amino group in the body is that of Ellinger (*12*), who isolated a small amount of a substance with characteristics of acetylphenylhydroxylamine from the blood of cats following large doses of acetanilide. Brownlee (*13*) and Rimington (*14*) have recently discussed this problem in relation to pigment metabolism.

It is believed that the procedures which we have developed can be applied to the study of many benzene derivatives containing amino

[4] W. Lipschitz has shown that excised tissues can reduce dinitrobenzene, with the formation of a hydroxylamine derivative (Zeit. f. Physiol Chem., 109: 189 (1920))

groups susceptible to acetylation in the test tube, and to diazotization (or other method of detection).[5]

The possibility that the hydroxylamine derivative of sulfanilamide is an important agent in the mechanism of therapeutic action, as suggested by Mayer (*3*) and by Main, Shinn, and Mellon (*8*), is given added support by the demonstration of this compound in the urine. Efforts to correlate the presence of the hydroxylamine with bacteriostatic or bactericidal effects should be made.

The oxidation products of the amino group are of increased toxicity. Thus we (*5*) have found that on subcutaneous injection 4-hydroxylaminobenzoic acid and 4,4′-azoxybenzoic acid were 4 times as toxic as 4-aminobenzoic acid; 4,4′-azobenzoic acid was 20 times and 4-nitrosobenzoic was 50 times as toxic as 4-aminobenzoic acid. The relation of the oxidation products of the amino group to toxicity of aminobenzene derivatives therefore deserves further study. Their relation to deranged pigment metabolism has already been suggested by the work of Ellinger (*12*), Heubner (*11*), Rimington (*14*), and Brownlee (*13*).

With the controlled conditions under which we have applied the methods for detection of oxidation products of aromatic amino groups, we have reason to place confidence in the results obtained. All of the evidence gathered so far has indicated the specificity of the reaction for the aromatic hydroxylamines. As with all colorimetric procedures, however, final proof of specificity requires extensive study.

SUMMARY

Colorimetric methods have been developed for the detection of aromatic hydroxylamines and for further oxidation products of the amino group of aminobenzene derivatives. The procedure can be applied to solutions containing sulfanilamide or other aminobenzene compounds.

Following the oral administration of sulfanilamide to the rat, rabbit, dog, and to man, the hydroxylamine derivative has been demonstrated in the urine. Smaller percentages occurred in the rat and dog; in these animals qualitative tests for further oxidation products of the amino group of sulfanilamide were obtained in the urine.

The reduction *in vitro* of 4-nitrosobenzoic acid to 4-hydroxylaminobenzoic acid and to 4-aminobenzoic acid by glutathione and cysteine was shown. With ascorbic acid the reduction was almost entirely to the hydroxylamine.

The significance of these results in explaining the mechanism of action and toxicity of sulfanilamide is discussed.

[5] Before application of these methods to other compounds the behavior of each compound must be carefully studied. For example, with dilute solutions of the highly unstable Beta phenylhydroxylamine, C_6H_5NHOH, the characteristic effect of acetic anhydride in bringing about a diazo reaction is present for only a few minutes after addition of acetic anhydride.

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PROVISIONAL MORTALITY RATES FOR THE FIRST SIX MONTHS OF 1939

The mortality rates in this report are based upon preliminary data for 42 States, the District of Columbia, Alaska, and Hawaii for the first 6 months of 1939. Comparative data for 40 States (District of Columbia included as a State) are presented for the first 6 months and by the 2 quarters of 1937–39.

This report is made possible through a cooperative arrangement with the respective States, which voluntarily furnish provisional quarterly and annual tabulations of current birth and death records. These reports are compiled and published by the United States Public Health Service.

Because of lack of uniformity in the method of classifying deaths according to cause, and because a certain number of certificates were not filed in time to be included, these data may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past, these preliminary reports have provided an early and accurate index of the trend in mortality for the country as a whole. Some deviation from the final figures for individual States is to be

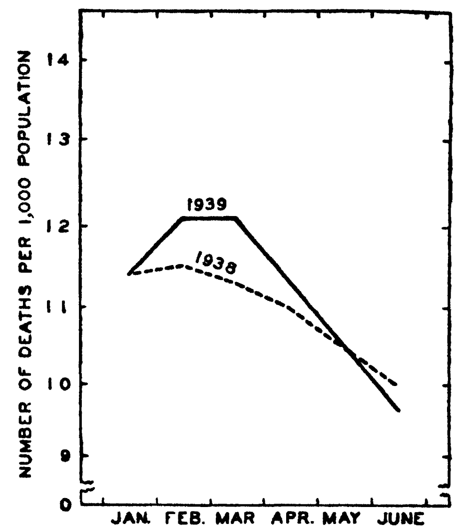

FIGURE 1.—Death rate per 1,000 population, by months, 1938 and 1939

expected, because of the provisional nature of the information. It is believed, however, that the trend of mortality within each State is correctly represented. Comparisons of specific causes of death among different States are subject to error because of differences in tabulation procedure and completeness of reporting. Comparisons of this nature should be made only from the final figures published by the Bureau of the Census.

Although the death rate from all causes, 11.2 per 1,000 estimated population, for the first 6 months of 1939 was 2.8 percent higher than the corresponding rate, 10.9, for 1938, the health of the Nation, insofar as it is measured by mortality rates, has been well above the average of immediately preceding years. Some increase in the death rate compared with that for last year was to be expected, since the

lowest rate in the history of the death registration area was recorded in 1938. The mortality rate from all causes during the current half year is 6 percent less than the corresponding rate for 1937. Even though the increase in mortality was slight, it was fairly widespread. Twenty-five of the forty States (including the District of Columbia) for which comparable data are available reported a higher rate in 1939 than in 1938.

The cause of death with the largest numerical increase was heart disease, which accounted for 8 percent more deaths than in the previous year. Influenza, with an increase of 65 percent over the first 6 months of 1938, registered the largest relative increase. However, the influenza death rate for the first 6 months of 1938, 14.5 per 100,000 population, was unusually low, so that the rate for 1939, 23.9 per 100,000 population, was still low when compared with the average of preceding years and, indeed, was only slightly more than one-half the rate for 1937.

Decreases of varying magnitude were reported for the other causes of death shown in the accompanying table. The death rate from the principal communicable diseases of childhood, measles, diphtheria, scarlet fever, and whooping cough, was appreciably less than for last year. Especially gratifying were the continued declines in the mortality rates from tuberculosis and diseases of pregnancy and childbirth. The death rate from tuberculosis, 47.3 per 100,000 population, decreased 3 percent and will apparently be definitely below 50 per 100,000 population at the end of the year. The maternal mortality rate reached a new low of 4 per 1,000 live births; this represents a decline of 23 percent since 1937.

The infant-mortality rate registered a drop of 2 percent and will be less than 50 per 1,000 live births for the first time in the history of the registration area if the present favorable conditions continue until the end of the year.

The birth rate, 16.2 per 1,000 population, was slightly less than the rate for 1938, 16.5 per 1,000 population. Owing to the combination of an increase in the death rate and a decrease in the birth rate, the crude rate of natural decrease fell from 5.6 in 1938 to 5.0 per 1,000 population for the current half year.

Provisional mortality from certain causes in the first 6 months of 1939, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																			
			Total infant mortality	Maternal mortality	Typhoid and paratyphoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis, under 2 years (119)	Nephritis (130–132)	All accidents (176–194, 201–214)	Automobile accidents (206, 208, 210)
40 STATES [1]																								
January–June:																								
1939	11.2	16.2	50	4.0	0.7	1.3	0.9	2.4	1.2	23.9	0.2	0.4	0.6	47.3	120.0	27.4	92.1	301.9	78.4	57.3	4.9	78.7	67.5	20.6
1938	10.9	16.5	51	4.4	.9	4.2	1.3	3.8	1.5	14.5	.3	.6	.9	48.9	117.6	24.8	87.4	280.6	81.6	60.7	7.0	80.0	66.4	21.3
1937	11.9	15.8	57	5.2	.9	1.0	2.1	3.2	1.6	45.1	.3	.6	2.3	54.8	113.6	25.5	90.7	286.1	112.8	62.8	5.9	83.3	76.6	26.5
January–March:																								
1939	11.9	16.1	54	4.1	.6	1.3	1.2	2.4	1.6	31.5	.2	.5	.7	46.8	120.3	29.4	97.0	323.0	104.7	56.1	3.9	83.1	65.8	20.1
1938	11.3	16.4	52	4.4	.7	3.9	1.6	3.4	1.9	20.7	.3	.6	1.1	48.5	117.2	26.1	90.9	292.5	103.5	56.6	4.1	82.1	65.9	21.5
1937	13.0	15.5	64	5.6	.8	.8	2.6	3.1	2.0	71.2	.3	.7	2.7	55.5	114.0	28.4	96.9	308.5	150.2	60.8	4.4	86.7	75.0	26.4
April–June:																								
1939	10.5	16.3	45	4.0	.8	1.3	.7	2.4	.7	16.4	.3	.4	.5	47.7	119.6	25.5	87.2	281.1	52.3	58.4	5.8	74.4	69.1	21.2
1938	10.5	16.7	50	4.3	1.0	4.5	1.0	4.2	1.0	8.4	.3	.6	.8	49.3	117.9	23.6	84.1	268.7	59.9	64.8	9.7	77.9	66.9	21.1
1937	10.9	16.2	50	4.8	1.0	1.2	1.6	3.2	1.1	19.2	.3	.6	1.9	54.1	113.1	22.7	84.6	263.5	75.9	64.8	7.3	80.0	78.1	26.7
Metropolitan Life Insurance Co., industrial policyholders, ages 1 and over (January–June): [2]																								
1939	8.3	------	------	------	.5	1.0	1.0	1.9	1.2	15.7	------	------	------	46.9	99.4	28.7	63.4	[3] 173.5	60.2	------	[4] 4.6	[5] 55.1	44.3	15.6
1938	8.1	------	------	------	.8	2.9	1.7	2.2	1.7	9.9	------	------	------	49.0	96.1	26.2	61.1	[3] 162.3	66.0	------	[4] 5.9	[5] 56.1	45.4	16.2
1937	9.0	------	------	------	.6	1.4	2.1	3.1	1.8	30.4	------	------	------	54.8	93.4	27.4	62.2	[3] 173.3	93.8	------	[4] 5.6	[5] 53.8	50.2	19.1
Alabama:																								
1939	10.1	20.3	65	6.4	1.2	3.2	.5	5.8	1.8	50.1	0.6	0.3	1.1	52.0	58.2	12.5	71.1	164.4	87.5	52.2	10.8	64.4	60.7	18.3
1938	10.7	21.2	65	6.6	1.7	10.4	.7	6.9	2.3	36.2	.5	.8	3.1	57.2	54.8	11.9	71.2	167.7	91.5	69.1	19.6	78.9	64.2	18.0
1937	11.4	20.8	71	6.6	1.2	.1	.3	6.5	2.4	82.8	.6	.3	5.2	65.3	57.1	11.0	68.5	164.9	117.0	57.0	13.1	79.4	70.3	20.2
Alaska:																								
1939	13.6	23.6	76	2.6	(6)	(6)	18.6	34.1	3.1	31.0	(6)	3.1	(6)	381.6	83.8	6.2	71.4	220.3	155.1	46.5	(6)	31.0	142.7	(6)
1938	24.0	31.6	85	6.4	3.2	3.2	3.2	96.0	(6)	67.2	(6)	(6)	(6)	582.6	96.0	(6)	182.4	252.9	284.9	51.2	(6)	16.0	227.3	(6)
1937	18.8	22.7	141	13.3	(6)	6.7	3.4	37.0	(6)	53.8	(6)	(6)	6.7	379.8	67.2	6.7	60.5	369.7	194.9	63.8	10.1	23.5	164.7	(6)

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1939, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis, under 2 years (119)	Nephritis (130–132)	All accidents (176–194, 201–214)	Automobile accidents (206, 208, 210)
40 STATES—continued																								
California:																								
1939	12.4	15.8	42	3.1	0.6	1.7	0.5	0.9	1.1	4.8	0.4	0.2	0.6	65.1	150.9	27.6	93.3	379.9	58.2	76.0	6.1	79.2	91.8	40.9
1938	12.5	15.9	44	3.5	1.2	1.4	.6	2.8	1.6	5.5	.2	.6	1.1	69.8	146.5	25.0	91.7	363.4	67.4	75.2	7.9	86.2	89.0	38.7
1937	14.2	14.5	51	4.4	.8	.9	1.0	5.3	1.9	37.4	.4	.6	2.6	82.0	140.2	28.9	90.7	406.5	110.4	81.7	7.7	89.2	104.7	46.8
Colorado:																								
1939	12.1	18.9	60	5.7	1.1	2.2	1.5	7.3	3.2	32.0	.6	.4	.9	61.7	118.3	17.9	95.5	258.8	114.2	65.2	4.7	86.5	80.2	21.9
1938	11.9	18.7	53	4.6	1.3	5.1	1.3	3.0	3.9	17.6	.8	.8	.8	67.2	119.1	18.8	91.0	246.3	117.0	74.1	6.6	87.8	80.7	26.1
1937	14.3	17.9	73	5.8	1.3	.2	2.3	6.2	2.4	86.0	1.9	1.3	3.8	73.2	122.4	17.5	92.8	242.0	244.8	81.2	4.9	86.0	87.4	27.9
Connecticut:																								
1939	10.5	12.7	39	3.4	.2	.8	.3	1.5	.6	8.1	(6)	.1	(6)	39.1	137.0	30.4	88.4	282.0	62.5	49.2	1.8	82.4	55.5	16.0
1938	10.5	13.4	36	2.5	.2	(6)	.5	.6	.9	5.1	(6)	.2	.2	37.9	137.0	31.9	91.6	261.9	66.9	50.8	2.6	87.1	59.3	16.8
1937	10.9	12.6	45	3.3	.3	1.3	1.2	1.7	.9	20.0	(6)	.5	.9	38.8	125.6	34.8	86.0	246.1	89.9	49.9	3.6	87.6	64.4	21.8
Delaware:																								
1939	13.1	15.9	49	4.8	(6)	(6)	.8	2.3	1.5	17.6	(6)	2.3	2.3	64.4	123.4	36.8	122.7	411.8	102.0	47.5	3.8	121.1	62.9	23.8
1938	12.6	15.7	53	3.9	.8	1.5	.8	8.5	1.5	16.2	(6)	(6)	.8	43.9	127.0	31.6	110.8	384.1	97.8	57.7	6.2	120.1	73.1	24.6
1937	14.4	15.9	67	3.9	1.5	2.3	(6)	7.7	.8	36.3	(6)	(6)	3.1	55.6	108.9	30.9	103.5	385.5	129.8	66.4	7.0	144.5	106.6	30.4
District of Columbia:																								
1939	13.3	21.0	44	5.5	.3	.6	(6)	1.9	.6	14.1	(6)	.3	.9	70.6	158.4	26.7	82.8	360.7	85.3	73.1	5.6	115.7	76.8	20.4
1938	13.1	19.7	49	5.3	.3	.6	1.0	.6	1.0	6.4	(6)	1.0	2.5	74.9	137.2	22.5	87.6	353.4	108.9	69.5	7.6	112.1	67.0	19.1
1937	15.2	19.0	65	6.8	1.0	3.8	1.0	4.5	3.2	28.6	(6)	1.0	7.7	102.0	144.4	32.2	104.2	346.4	166.3	77.2	5.8	98.7	81.0	26.7
Florida:																								
1939	12.7	16.4	65	6.3	1.6	1.3	.4	4.2	1.5	34.8	.1	.2	.6	56.2	102.7	23.4	105.9	277.3	65.4	85.5	13.6	104.1	102.8	40.9
1938	12.9	16.1	62	7.8	3.4	2.5	.1	4.4	1.9	29.6	.4	.6	1.1	58.9	95.0	20.7	106.1	273.3	79.9	95.0	15.6	101.0	99.3	42.4
1937	13.1	15.9	64	7.4	3.4	.4	.1	3.3	2.4	54.2	.2	.4	6.6	59.4	96.7	20.4	108.1	253.6	81.1	94.5	13.4	103.4	107.5	41.4
Georgia:																								
1939	9.6	18.3	67	6.1	1.4	2.8	.3	4.4	1.3	40.5	.3	.1	.4	44.3	56.2	11.9	89.5	162.0	83.4	53.6	12.1	90.6	52.4	18.4
1938	10.7	19.0	73	6.7	2.2	7.9	.5	7.1	1.6	33.4	.4	.2	1.0	52.3	56.4	13.4	85.8	165.9	101.4	70.1	20.4	108.9	63.6	23.2
1937	10.9	18.7	66	7.7	2.0	.1	.3	3.4	2.0	70.0	.6	.2	1.7	49.9	54.1	11.3	84.7	167.4	107.8	63.4	12.9	104.1	67.9	25.7

Hawaii:																								
1939	7.2	18.1	62	3.3	1.7	(6)	(6)	6.9	1.3	5.2	(6)	.4	(6)	62.2	59.6	16.8	41.0	120.0	60.9	49.2	9.9	66.1	45.8	12.1
1938	7.3	20.0	58	2.8	1.3	.4	.4	5.7	.9	4.4	.9	.4	.9	61.2	61.2	15.8	51.5	111.8	62.1	53.7	16.3	60.8	53.3	12.8
1937	9.0	20.4	77	5.5	2.2	80.6	(6)	.9	3.6	8.6	(6)	(6)	.9	79.2	74.3	15.3	39.6	115.2	100.4	66.6	20.7	70.2	53.1	14.8
Idaho:																								
1939	9.9	22.1	48	2.7	2.8	1.6	.8	2.4	.8	28.0	.4	1.2	2.0	21.2	94.6	25.2	67.1	265.2	75.9	56.3	2.8	41.9	85.5	26.0
1938	9.2	22.2	43	3.6	2.4	1.2	.8	4.4	(6)	20.6	(6)	1.6	2.0	22.6	77.0	10.1	73.0	180.7	92.0	58.9	1.6	46.8	73.0	27.0
1937	10.7	21.0	46	3.5	1.2	5.3	2.0	2.4	.4	69.1	(6)	1.2	1.2	22.5	80.2	11.0	75.7	174.2	96.9	69.9	4.0	35.6	87.9	30.7
Illinois:																								
1939	11.7	14.2	42	3.3	.2	.1	1.4	2.4	1.7	21.4	.2	.2	.2	49.8	140.2	31.4	78.4	364.7	71.3	60.5	2.3	102.2	63.4	23.0
1938	11.0	14.6	43	3.4	.4	5.2	2.4	1.2	1.7	6.9	.1	.4	.3	47.9	132.9	28.7	75.4	322.0	69.3	61.7	3.9	97.8	66.1	22.3
1937	11.9	13.3	50	4.5	.2	.2	3.2	2.1	2.2	30.2	.2	.3	1.8	53.6	128.4	28.4	75.7	309.3	92.8	69.2	3.1	103.7	76.0	30.0
Indiana:																								
1939	11.7	15.1	45	4.4	1.0	.2	2.0	1.5	1.5	44.2	(6)	.6	.5	42.4	111.6	17.0	138.2	262.0	94.8	(7)	3.3	65.0	65.3	23.8
1938	10.9	15.6	43	4.7	.2	5.8	2.2	1.7	2.0	14.9	.4	.6	1.1	40.5	111.4	17.0	122.5	242.5	79.1	(7)	4.5	64.7	64.6	26.6
1937	12.0	13.8	57	4.1	.4	.6	4.4	4.6	1.3	54.9	.3	.5	2.3	49.2	104.8	16.1	123.9	264.3	124.1	(7)	4.8	68.6	77.0	34.6
Iowa:																								
1939	10.5	16.0	41	2.3	.5	1.9	1.6	1.6	.4	41.2	.2	.5	.5	18.5	121.9	27.5	110.3	286.8	68.7	55.4	2.1	58.0	62.0	16.9
1938	9.8	16.5	39	3.3	.4	1.6	2.8	3.2	.9	15.5	.5	.8	.7	20.0	127.5	21.7	104.8	249.7	73.4	55.6	2.4	61.2	57.9	14.4
1937	10.1	14.8	46	5.2	.4	.1	5.8	2.2	.2	56.3	.3	.9	1.1	21.2	119.1	21.6	105.9	225.8	84.1	51.5	2.9	62.7	71.4	18.4
Kansas:																								
1939	10.1	14.4	42	4.3	.4	.2	.8	.4	.6	26.2	.1	1.4	.2	24.7	119.0	28.0	89.9	260.8	58.2	54.2	2.2	99.7	89.7	18.7
1938	10.2	14.8	47	4.7	.4	2.3	1.7	3.8	.5	19.7	(6)	.8	.4	24.5	116.2	24.9	96.1	238.5	63.5	58.5	2.8	100.3	99.0	20.8
1937	11.1	14.1	49	4.7	(6)	.1	6.3	1.1	1.5	58.0	.3	1.2	1.7	28.6	114.8	24.6	106.6	251.7	86.1	59.7	3.6	92.2	107.1	21.7
Maine:																								
1939	13.5	17.0	57	4.6	1.4	.7	.5	4.4	3.5	32.1	1.4	.2	.2	34.2	150.1	26.3	131.1	402.6	99.9	52.5	4.0	86.3	62.6	14.8
1938	12.3	17.5	51	4.8	1.6	2.8	(6)	2.6	1.4	22.8	.7	.2	(6)	29.6	142.4	28.9	113.3	335.4	95.2	56.4	5.4	85.1	55.7	13.4
1937	14.2	18.8	60	5.2	.9	.2	.7	1.9	.5	65.7	.5	.2	.9	34.6	145.6	23.8	125.3	395.1	126.7	57.9	5.4	95.9	60.1	13.4
Maryland:																								
1939	13.3	16.5	52	3.5	.6	1.8	.2	1.2	1.3	15.5	(6)	.6	.8	80.7	143.3	32.4	112.0	363.9	97.0	53.2	4.9	137.7	73.0	20.5
1938	12.7	17.0	56	3.8	.8	.7	1.0	4.6	.8	10.5	(6)	1.4	1.0	81.5	134.1	30.0	101.4	340.2	102.5	55.0	5.9	137.4	65.9	19.9
1937	14.0	16.1	65	3.8	.6	4.2	1.1	6.1	1.8	27.4	.4	1.9	3.7	88.5	131.6	27.1	117.6	332.1	144.0	62.7	7.4	152.3	86.6	29.1
Massachusetts:																								
1939	11.3	(7)	(7)	(7)	.3	.6	.5	1.5	.2	8.2	(6)	.3	.6	36.3	145.5	34.9	100.9	399.0	89.8	51.2	1.7	64.4	53.5	11.4
1938	11.7	(7)	(7)	(7)	.3	.2	1.0	1.0	.3	5.0	.2	.2	.4	39.8	156.8	34.4	99.5	386.3	93.9	55.6	2.2	72.2	53.4	12.8
1937	12.6	(7)	(7)	(7)	(6)	1.3	1.4	2.8	.4	16.7	(6)	.3	2.5	43.8	148.9	37.8	100.7	391.8	132.4	64.6	2.6	77.4	62.4	17.9
Michigan:																								
1939	11.4	18.7	45	3.5	.4	1.1	2.2	1.9	.7	27.7	(6)	.2	.4	41.2	123.7	30.4	94.2	330.1	78.3	60.9	3.7	62.5	68.4	22.3
1938	10.6	19.1	45	3.5	.6	3.7	2.6	1.9	.8	8.1	.1	.3	.5	40.7	116.7	27.7	90.8	297.3	69.9	58.2	4.3	58.4	62.8	22.3
1937	11.8	18.0	55	3.8	.4	.2	4.5	2.7	1.0	31.4	(6)	.3	1.1	46.9	115.5	27.0	91.1	291.2	112.7	64.2	3.9	66.2	80.1	33.4
Minnesota:																								
1939	10.5	18.2	40	2.9	.1	4.4	.7	.6	.4	21.1	.1	.2	.3	32.7	141.4	29.4	99.5	279.5	76.2	58.8	3.2	44.6	64.8	15.7
1938	9.8	17.6	40	3.5	.2	.7	1.7	2.7	.3	10.5	.2	.4	.4	30.4	140.0	26.1	88.2	250.4	76.9	52.1	1.9	44.9	62.4	19.4
1937	10.7	18.4	43	3.4	.3	.2	2.4	2.1	.4	43.2	(6)	.9	1.5	37.0	141.2	24.7	91.6	241.4	98.2	55.3	2.1	48.4	65.9	17.1
Missouri:																								
1939	11.7	15.9	45	3.7	1.1	.2	1.2	1.9	2.0	31.9	.5	.4	.6	47.6	123.6	25.1	94.7	277.1	106.0	58.4	4.4	113.9	64.6	19.2
1938	11.6	15.4	52	3.7	1.4	9.2	3.1	5.3	3.0	23.6	.6	.6	.6	51.8	125.3	24.0	91.2	276.7	114.5	57.4	6.4	107.5	67.6	22.4
1937	12.9	13.1	68	6.5	2.7	.1	4.1	3.0	2.4	63.2	.4	.8	1.8	60.6	122.9	25.1	99.8	282.5	165.9	58.3	5.2	109.8	80.2	27.3

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1939, with comparative provisional data for the corresponding period in preceeding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis, under 2 years (119)	Nephritis (130–132)	All accidents (176–194, 201–214)	Automobile accidents (206, 208, 210)
40 STATES—continued																								
Montana:																								
1939	11.0	19 5	58	3 6	1.1	5.9	1.5	5.1	1 1	30 8	(6)	1.5	0.7	46.9	107.4	18.0	94.2	244 9	87 6	60.9	4.8	57.6	86.9	23.1
1938	10.7	19 2	41	3.8	.7	1.5	3 0	4.8	1.8	27 4	(6)	.4	1 5	50.0	99.5	19 2	89.2	222.7	98.0	66.6	3.0	47.7	101.4	20.4
1937	12.6	19.2	57	4.3	2.6	.4	3.7	1.1	2.2	102.2	(6)	.7	2.2	43.4	106.2	19.8	96.9	227.1	142.9	67.7	1.1	70.3	91.3	20.2
Nebraska:																								
1939	9 3	15 8	33	3 9	.6	1.9	1 3	.7	1.2	26 4	.3	.6	.3	16.7	108.8	26.0	88.3	207.7	68.5	52.6	1.6	69.2	61.4	15.6
1938	9.0	15.6	40	3.1	.4	1 2	1.5	2.8	1.2	14.6	.1	.6	.4	17.3	124.0	24.2	88.4	226.0	65.5	48.5	2.2	61.9	49.4	13 9
1937	10.5	15.7	51	5.2	.4	.4	4.9	2.4	1.2	76.0	.6	.3	1.6	23.7	107.3	28.5	87.7	236.8	83.5	61.2	3.1	67.1	58.2	20.1
Nevada:																								
1939	12.0	17.9	47	2.2	(6)	3.9	(6)	(6)	(6)	9.8	(6)	(6)	(6)	56.8	121.4	7.8	86.1	311.3	117.5	48 9	(6)	48.9	129.2	48.9
1938	11 9	17.0	43	3.5	2.0	(6)	(6)	2.0	5 9	2.0	(6)	(6)	(6)	67.2	100 8	15.8	83 0	276 7	128.5	57 3	(6)	37.6	102.8	37.6
1937	13.2	13.6	60	10.3	(6)	(6)	4.0	4.0	(6)	16 0	(6)	(6)	(6)	71.9	73.9	10.0	83.8	257 6	173.7	37.9	4.0	85.9	135.8	39.9
New Jersey:																								
1939	10.6	12.8	43	3.1	.2	(6)	.7	1.4	.5	9.3	.1	.5	.5	44.3	131.2	35 3	85.0	357.8	62.5	55 0	3.0	71.8	52.6	16.9
1938	10.4	12 6	43	3.5	.2	1 4	.4	1.1	.9	6.4	.1	.8	.7	46.7	126 0	30 5	81.4	335.7	72 8	57.1	3.0	76 0	54.1	18.2
1937	10.8	12.3	44	3.7	.5	2.2	.6	1.4	.7	16.8	.1	.7	1.7	50.5	122.2	32.8	79.6	331.7	92.1	57.4	2.6	74.0	74.0	24.1
New Mexico:																								
1939	14.4	36.2	99	5.2	2.4	1.9	.9	9.5	5.2	43.6	.5	(6)	1.9	96.6	64.4	9.0	52.5	144.4	148.6	75.3	12.8	63.0	88.5	40.7
1938	13.3	34.2	88	5.2	2.4	22.4	1.42	1.6	3.8	20.5	1.0	(6)	1.0	92.7	64.5	7.2	51.1	146.7	113.2	84.1	22 0	70.2	86.5	31.5
New York:																								
1939	12 2	14.4	43	3.1	.2	.6	.5	1.0	.3	6.7	.1	.4	.6	51.7	156.8	43.6	71.8	397.0	78.1	62.0	4.5	76.7	59.6	14.3
1938	12 0	14.4	44	3.9	.3	1 2	.7	1.2	.4	4.9	(6)	.8	1.0	53.9	155.9	38.2	68.3	382.4	81.6	63.3	5.3	78.2	60.4	16.4
1937	12.8	14.5	49	4.1	.3	.6	1.2	1.2	.9	17.1	(6)	.7	1.5	62.2	150.6	40.1	79.6	389.7	119.9	70.5	6.1	82.8	68.0	19.8
North Carolina:																								
1939	9 3	21.7	63	5.5	.6	3.1	.5	8.0	2.8	27.8	.1	.2	.5	54.2	57.1	13.6	83.1	163.7	79.3	57.7	15.3	83.3	59.3	21.8
1938	10.0	22.7	69	6.4	1.3	11.8	.7	7.7	3.6	19.2	.3	.6	1.1	56.1	54 0	10.9	84.0	167.4	95.2	73 2	27.2	93.3	59.3	21.3
1937	10.2	23.1	65	6.0	1.4	1.3	.4	3.6	3.0	42.6	.3	.6	1.4	60.8	52.6	11.0	82.1	165.6	107.8	60.3	16.4	90.0	67.7	24.9

North Dakota:																								
1939	7.8	18.9	52	3.6	.9	5.7	1.4	2.3	.6	27.8	(6)	1.1	.9	21.6	83 2	21.9	69.6	185.2	65.3	49.4	6.0	40.0	37.5	9.7
1938	7.1	18.5	45	1.7	(6)	2.8	3.4	8 5	.8	11 1	(6)	.6	1.4	23.9	83.2	19 9	56.4	142.7	58.4	47.3	5.1	42.2	39.9	10.5
1937	8.6	18.8	56	5.3	(6)	(6)	1.7	.3	1.1	47.4	(6)	.3	2.9	26.8	78.5	19.1	77.7	172.5	87.7	53.7	9.7	37.4	50.6	11.7
Ohio:																								
1939	12.1	15.1	45	4.2	.5	.1	1.5	1.3	.9	30.8	.1	.6	.2	47.5	131.9	31.1	117.6	325.1	82.0	58.2	2.8	83.4	79.1	23.1
1938	11.4	16.2	46	3.6	.4	5.0	1.7	2.0	1.2	14.7	.2	.3	.9	49 0	127.8	27.9	107.0	289.4	77.1	59.5	3.4	81.4	79.0	23.6
1937	12.6	14.9	53	5.8	.8	1.8	2.4	3.8	1.4	49.3	.2	1.0	2.2	54.8	113.5	28.5	115.9	299.6	111.4	63.3	4.4	85.0	92.6	36.4
Oklahoma:																								
1939	8.6	16.4	58	4.1	2.0	5.7	1.0	1.1	2.5	31.1	.4	.4	.4	43.6	72.5	12.7	81.9	153.6	80.6	48.2	5.4	56.0	88.6	18.7
1938	8.4	17.5	47	4.7	2.3	3.2	.9	10.7	4.2	22.8	1 3	.5	1.3	48 8	71.7	13.3	67.8	134.7	71.3	53.5	6.4	61.0	68.3	20.8
1937	9.2	14.2	66	6.4	2.2	1.7	1.7	1.7	2.0	71.0	1.1	.2	3.4	56 0	73.9	13.3	62.2	141.2	103.7	55.7	4.0	68.9	60.5	22.9
Oregon:																								
1939	11.6	15.9	37	1.8	.6	1.2	.8	1.2	(6)	11.8	.4	.8	.4	33.3	133.8	26.3	116.8	297.6	54.3	41.8	1.4	123.9	85.5	25.9
1938	11.8	15.8	38	3.4	.2	.6	1.4	2.5	1.4	12.7	.6	2.3	1.6	29.4	139.9	23.2	107.0	283 3	70.9	48.5	2.1	120.8	82.6	24.9
1937	13.2	15.1	46	4.3	.6	.2	1.4	2.4	.2	54.6	.6	1.0	.8	38.1	122.3	24.0	111.9	302.8	89.7	57.1	.6	115.6	88.6	29.1
Pennsylvania: [9]																								
1939	11.5	15.5	51	3.4	.7	.2	.8	2.1	1.0	21.5	(5)	.7	.8	42.7	123.7	36.8	89.8	352.5	72.8	52.5	4.0	92.0	49.4	12.6
1938	11.3	16.2	51	3.8	.5	5.0	1.9	1.8	1.2	15.4	.1	.8	.8	43.3	117 2	33.3	86.3	324.9	81.7	54.4	4.2	86.9	55.9	15.3
1937	12.6	15.6	58	5.0	.5	.9	2.4	2.9	1.3	52.9	.1	.8	2.1	51.4	115.4	35.3	84.9	337.9	114.5	55.0	4.0	96.1	61.0	20.1
Rhode Island: [9]																								
1939	12.4	14.9	41	2.4	(6)	(6)	(6)	4.3	(6)	9.9	(6)	(6)	.7	42.2	154.9	37.9	91.4	416.8	91.1	64.9	5.0	107.0	56.0	10.6
1938	12.7	15.3	42	2.3	.4	(6)	.7	2.5	.4	7.1	(6)	.7	1.4	46.5	157.6	44.4	106.1	379.8	129.2	59.3	2.8	122.8	54.3	11.4
1937	13.9	15.0	56	4.3	.4	(6)	2.1	2.5	.4	24.5	(6)	.7	4.3	55.0	162.6	45.8	109.0	412.5	146.9	56.8	3.9	126.7	46.9	13.1
South Carolina:																								
1939	9.7	19.0	76	6.5	2.9	.7	.2	9.6	1.8	37.5	2.6	.3	.6	43.0	49.3	13.1	92.5	183.1	77.0	33.5	5.1	86.6	60.1	23.1
1938	10 6	19 0	92	9.0	3.1	12.9	.6	15.4	1.3	42.6	.5	.5	.7	48.6	50.1	11.0	90.7	185.4	100.2	41.3	10.7	83.4	52.0	21.1
1937	10.6	18.4	91	8.4	4.3	1.0	.4	3.0	2.5	65.3	.6	.3	1.1	47.3	48.5	11.2	89.7	178.5	109.4	24.0	6.9	85.9	63.7	24.7
South Dakota:																								
1939	8.9	17.5	44	4.0	.3	7.9	1.5	1.2	2.9	33 8	.3	.6	.9	26.5	98 1	28.8	78.3	211.3	71.3	55.0	4.1	40.4	39.0	13.4
1938	7.2	16.3	51	3.2	1.4	.3	1.4	16.6	.6	13.1	(6)	(6)	.3	35.0	90 6	17.5	64.7	169.0	65.8	50.4	3.5	39 9	50.4	11.9
1937	9.7	16.7	57	5.6	.3	(6)	4.7	1.2	.6	70.8	(6)	.9	1.7	36.1	79.6	21.8	73.7	179.5	72.1	46.3	2.6	47.2	51.6	13.1
Tennessee:																								
1939	9.5	15.4	59	5.5	1.4	1.7	.7	3.4	1.5	49 7	.5	.7	.7	78.0	67.9	12.5	79.1	167.6	86.4	54.2	7.5	58.2	55.0	15.7
1938	9.6	15.9	66	6.3	1.6	12.1	.4	8.0	2.3	32.7	.6	.4	1.6	75 9	67.8	10 0	79.4	159 9	92.9	68.2	17.7	60.0	54.6	16.3
1937	10 6	15.5	67	8.3	2.1	1.1	.8	3.9	3.3	76.5	.5	.6	3.3	86.8	65.4	11.3	79.4	160.2	120.2	62.7	10.3	65.4	63.6	21.4
Texas:																								
1939	9.2	16.5	75	5.4	3.1	2.1	.4	4.5	2.3	24.4	.8	.4	.4	59.7	67.0	12.7	65.0	173.2	76.7	(7)	27.0	58.2	59.9	20.8
Utah:																								
1939	9.0	25.1	41	2.9	.4	.4	.4	.8	.4	13.2	(6)	.4	1.2	17.0	96 0	17.8	54.6	250 0	58.4	60.4	2.3	64 6	70.0	24.4
1938	9.3	25 3	44	4.3	(6)	3.9	1.9	5.4	1 9	13.2	(6)	.4	2 7	23.3	87 6	20.5	51 2	242.4	73.3	60.1	1.9	52.0	88 8	33.4
1937	10.1	23.5	42	3.6	.8	1.2	2.0	3.1	1.2	38.5	.4	1.2	2.0	23.7	90.5	23.7	62.2	251.0	75.4	71.5	2.3	57.9	76.5	29.1
Vermont:																								
1939	11.3	14.7	38	3.5	(6)	1.0	1.6	4.7	1.6	37.3	.5	.5	.5	43.5	131.7	34.2	114.0	380 5	107.8	42.5	4.7	76.2	56.0	12.4
1938	11.0	14.7	52	3.5	(6)	6.3	.5	3.7	6.3	18.3	.5	.5	(6)	41.3	122.8	26.6	112.3	306 7	103.4	56.9	2.1	83.6	48.1	14.6
1937	12.0	13.1	57	12.0	1.0	(6)	(6)	1.0	1.0	53.7	(6)	(6)	.5	46.9	135.8	22.6	104.2	321.7	126.4	53.2	3.7	74.8	59.5	15.8
Virginia:																								
1939	10.7	17.9	68	5.6	.7	1.2	.2	5.6	2.6	32.4	.3	.3	1.1	61.5	73.6	18.0	102.7	244.7	82.5	45.1	5.5	87.9	63 2	23.0
1938	10.7	18.4	68	5.4	1.2	6.0	.2	8.0	2.6	23 9	.3	.1	2.1	67 7	75.1	16 2	93.8	230 5	85.8	49.4	9.8	82.4	63 2	21 5
1937	11.4	18.2	69	5.4	1.0	3.7	.4	7.8	2.0	65.5	.6	.7	6.2	65.8	71.8	16.9	92.3	233.0	132.4	43.9	7.2	86.4	61.5	22.6

See footnotes at end of table.

***Provisional** mortality from certain causes in the first 6 months of 1939, with comparative provisional data for the corresponding period in preceding years*—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23–32)	Cancer, all forms (45–53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis, under 2 years (119)	Nephritis (130–132)	All accidents (176–194, 201–214)	Automobile accidents (206, 208, 210)
40 STATES—continued																								
Washington:																								
1939	11.5	14.7	42	4.1	.7	1.0	.7	.2	.5	12.9	.6	.7	.8	43.9	138.2	25.7	113.5	308.0	66.1	57.2	1.8	68.3	82.2	22.2
1938	11.3	15.1	39	3.8	.6	.2	.5	2.9	.8	15.3	.1	1.8	.7	45.6	135.2	24.5	112.9	286.5	81.6	58.2	.6	71.6	81.1	23.8
1937	12.0	14.0	44	5.1	.7	1.3	1.6	.8	1.1	42.2	.1	2.4	1.3	46.0	129.3	23.5	107.9	304.8	88.5	54.7	1.2	79.8	87.3	26.6
West Virginia:																								
1939	9.0	19.0	58	3.7	2.1	.3	1.4	2.1	1.9	28.7	.2	.8	1.8	48.1	68.2	17.1	78.8	176.2	79.0	43.4	5.2	65.5	66.3	14.8
1938	9.4	20.1	64	3.9	2.0	11.4	1.8	10.0	2.7	26.1	1.1	.7	2.8	49.8	69.1	16.3	73.3	165.0	86.6	49.8	7.6	71.6	69.1	16.5
1937	10.6	20.2	64	6.4	1.6	1.5	2.1	10.3	3.1	69.4	.8	.1	6.9	56.0	66.9	15.7	73.0	174.3	122.8	54.8	7.9	66.0	93.4	20.1
Wisconsin:																								
1939	11.5	17.6	47	3.2	.1	1.3	1.4	1.8	.2	31.5	.1	.3	.3	31.0	138.8	31.0	99.3	349.1	70.1	(7)	4.6	67.0	78.5	18.1
1938	10.6	17.9	44	2.9	.3	1.9	1.4	1.8	.4	7.7	.3	.3	.2	31.7	134.9	31.3	94.3	298.0	68.8	(7)	3.0	67.3	62.3	16.9
1937	11.9	17.3	49	3.9	.3	.1	3.5	1.0	.6	74.4	.1	.4	1.0	36.9	136.7	28.2	97.3	310.3	90.3	(7)	4.2	74.8	75.0	24.2
Wyoming:																								
1939	9.1	19.0	54	4.9	.8	.8	(6)	.8	1.7	20.3	(6)	(6)	(6)	26.2	83.5	14.3	62.4	221.1	60.8	55.7	1.7	75.1	91.1	32.9
1938	9.5	18.7	58	4.5	(6)	(6)	.8	22.1	1.7	20.4	(6)	.8	1.7	19.6	92.7	12.8	69.8	210.2	87.6	71.5	7.6	50.2	102.1	32.3
1937	11.5	18.3	54	5.1	.9	.9	6.9	3.4	(6)	81.5	.9	1.7	3.4	15.4	73.8	8.6	84.1	270.3	149.3	77.2	11.2	45.7	105.5	40.3

[1] Includes all States with data for the 6-month period of 1937, 1938, and 1939. The District of Columbia is included as a State. Estimated population July 1, 1939: 103,761,000.
[2] These data are taken from the July 1938 and 1939 Statistical Bulletins published by the Metropolitan Life Insurance Co. All figures are provisional and are subject to correction, since they are based on provisional estimates of lives exposed to risk (17,700,000 persons in 1938). Data do not include all diseases reported to the Public Health Service.
[3] Excludes pericarditis, acute endocarditis, acute myocarditis, coronary artery diseases, and angina pectoris.
[4] Classified as diarrhea and enteritis, age not specified.
[5] Chronic nephritis (Bright's disease) only.
[6] No deaths reported.
[7] Data not available.
[8] Less than 0.1 per 100,000 population.
[9] January to May.

COURT DECISION ON PUBLIC HEALTH

Compensation granted under workmen's compensation act for death from lobar pneumonia.—(North Dakota Supreme Court; *Tweten* v. *North Dakota Workmen's Compensation Bureau,* 287 N.W. 304; decided May 26, 1939, rehearing denied August 9, 1939.) A proceeding under the workmen's compensation act was instituted by a widow to recover compensation for the death of her husband from lobar pneumonia. The deceased had been employed by a county in repairing buildings, repairing and constructing fences, and planting trees. In this work the deceased was subjected to exposure to cold and wet weather. He contracted lobar pneumonia and died therefrom.

The workmen's compensation act provided as follows: "'Injury' means only an injury arising in the course of employment, * * *. The term 'injury' includes in addition to any injury by accident, any disease approximately [sic] caused by the employment."

The supreme court said that in its opinion "the conclusion reasonably to be drawn from the evidence in this case is that Tweten contracted the disease from which he died during the course of his employment, and that the exposure to which he was subjected in the course of such employment resulted in the disease from which he died." "In other words," said the court, "the evidence, as we view it, shows that the disease from which Tweten died was proximately caused by his employment."

The defendant contended that the disease from which the deceased died was not a compensable "injury" within the meaning of the compensation act, it being asserted that, in order to constitute a compensable injury, pneumonia must arise from, and be proximately caused by, some wound or injury sustained in the course of employment. The holding of the court was adverse to this contention.

DEATHS DURING WEEK ENDED SEPTEMBER 30, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 30, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,781	7,722
Average for 3 prior years	[1] 7,601	
Total deaths, first 39 weeks of year	324,092	317,009
Deaths under 1 year of age	489	505
Average for 3 prior years	[1] 516	
Deaths under 1 year of age, first 39 weeks of year	19,580	20,589
Data from industrial insurance companies:		
Policies in force	66,640,202	68,322,230
Number of death claims	12,325	11,194
Death claims per 1,000 policies in force, annual rate	9.6	8.5
Death claims per 1,000 policies, first 39 weeks of year, annual rate	10.1	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 7, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	1	1	------	------	------	------	30	5	8	7
New Hampshire	0	0	0	0	------	------	------	------	41	4	0	1
Vermont	0	0	0	0	------	------	------	------	134	10	0	8
Massachusetts	7	6	6	5	------	------	------	------	64	54	36	27
Rhode Island	0	0	0	0	------	------	------	------	115	15	0	0
Connecticut	6	2	2	2	3	1	1	2	9	3	9	9
MID. ATL.												
New York	4	10	11	15	[1] 3	[1] 4	[1] 9	[1] 8	15	88	45	45
New Jersey	4	3	14	14	7	6	16	8	7	6	11	11
Pennsylvania	9	18	20	23	------	------	------	------	13	26	34	49
E. NO. CEN.												
Ohio	29	38	47	47	3	4	------	1	15	19	5	29
Indiana	21	14	56	48	1	1	4	18	3	2	2	15
Illinois	11	17	31	31	2	3	9	11	9	13	18	18
Michigan [2]	3	3	17	17	18	17	1	1	4	4	54	27
Wisconsin	2	1	1	4	33	19	28	17	47	27	66	43
W. NO. CEN.												
Minnesota	2	1	6	9	2	1	1	1	0	0	58	5
Iowa	18	9	6	8	------	------	32	2	10	5	10	8
Missouri	9	7	19	30	3	2	10	35	0	0	3	18
North Dakota	7	1	2	2	------	------	5	------	0	0	73	8
South Dakota	0	0	4	4	------	------	------	------	23	3	4	2
Nebraska	0	0	5	3	------	------	------	------	38	10	2	1
Kansas	8	3	9	9	8	3	6	8	84	30	4	4

See footnotes at end of table.

***Cases of certain diseases reported by telegraph by State health officers for the week ended October 7, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median*—Continued**

Division and State	Diphtheria Oct. 7, 1939, rate	Diphtheria Oct. 7, 1939, cases	Diphtheria Oct. 8, 1938, cases	Diphtheria 1934–38, median	Influenza Oct. 7, 1939, rate	Influenza Oct. 7, 1939, cases	Influenza Oct. 8, 1938, cases	Influenza 1934–38, median	Measles Oct. 7, 1939, rate	Measles Oct. 7, 1939, cases	Measles Oct. 8, 1938, cases	Measles 1934–38, median
SO. ATL.												
Delaware	20	1	1	1	------	------	------	------	0	0	0	2
Maryland [2] [3]	9	3	15	13	15	5	2	3	6	2	14	4
Dist. of Col	24	3	7	11	------	------	------	------	0	0	4	0
Virginia	131	70	93	64	52	28	67	------	11	6	8	9
West Virginia	56	21	16	34	13	5	9	9	3	1	1	5
North Carolina [3]	145	99	173	112	1	1	4	4	22	15	108	11
South Carolina [3]	41	15	42	18	290	106	235	171	0	0	1	1
Georgia [3]	75	45	59	40	40	24	18	------	5	3	0	0
Florida [3]	15	5	9	9	6	2	1	------	6	2	0	8
E. SO. CEN.												
Kentucky	49	28	56	56	7	4	20	6	30	17	5	13
Tennessee [3]	62	35	48	50	7	4	28	12	11	6	2	2
Alabama [3]	56	32	46	45	21	12	19	9	16	9	13	1
Mississippi [3]	61	24	32	23	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas [3]	45	18	32	25	27	11	26	7	2	1	1	0
Louisiana [3]	31	13	24	18	12	5	1	4	7	3	5	8
Oklahoma	24	12	29	21	34	17	42	32	0	0	4	1
Texas [3]	22	27	53	48	80	97	115	61	19	23	9	13
MOUNTAIN												
Montana	122	13	1	1	28	3	2	2	112	12	54	14
Idaho	0	0	1	0	------	------	1	1	10	1	3	0
Wyoming	0	0	0	0	------	------	------	------	1,353	62	20	2
Colorado	77	16	16	6	53	11	------	------	58	12	8	10
New Mexico	37	3	3	3	------	------	------	1	25	2	37	8
Arizona	12	1	2	2	564	46	31	17	12	1	2	2
Utah [2]	10	1	0	0	10	1	------	------	30	3	7	7
PACIFIC												
Washington	0	0	0	1	------	------	------	------	308	100	15	15
Oregon	0	0	5	3	40	8	5	14	99	20	7	7
California	10	12	34	34	19	23	11	15	63	77	169	55
Total	25	630	1,054	1,054	22	474	759	506	26	652	939	922
40 weeks	15	15,531	19,306	19,306	182	154,626	49,948	106,981	355	351,834	765,503	673,320

Division and State	Meningitis, meningococcus Oct. 7, 1939, rate	Meningitis, meningococcus Oct. 7, 1939, cases	Meningitis, meningococcus Oct. 8, 1938, cases	Meningitis, meningococcus 1934–38, median	Poliomyelitis Oct. 7, 1939, rate	Poliomyelitis Oct. 7, 1939, cases	Poliomyelitis Oct. 8, 1938, cases	Poliomyelitis 1934–38, median	Scarlet fever Oct. 7, 1939, rate	Scarlet fever Oct. 7, 1939, cases	Scarlet fever Oct. 8, 1938, cases	Scarlet fever 1934–38, median
NEW ENG.												
Maine	6	1	0	0	0	0	0	0	145	24	9	10
New Hampshire	0	0	0	0	10	1	0	0	10	1	0	1
Vermont	0	0	0	0	80	6	0	0	54	4	10	5
Massachusetts	1.2	1	0	0	7	6	0	4	29	25	57	69
Rhode Island	0	0	0	1	0	0	0	0	23	3	3	12
Connecticut	0	0	1	1	0	0	1	1	39	13	20	20
MID. ATL.												
New York	0	0	5	5	31	77	2	6	33	83	104	145
New Jersey	1.2	1	0	0	12	10	0	1	39	33	20	37
Pennsylvania	0.5	1	1	4	14	28	11	11	61	120	127	188

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 7, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0.8	1	3	2	9	12	8	7	143	186	142	142
Indiana	0	0	0	0	4	3	4	3	85	57	83	83
Illinois	0	0	1	3	5	7	3	23	76	116	195	195
Michigan [3]	3	3	2	2	40	38	2	16	121	114	226	117
Wisconsin	1.8	1	0	1	18	10	2	6	121	69	85	102
W. NO. CEN.												
Minnesota	0	0	0	0	78	40	3	4	62	32	53	53
Iowa	0	0	1	1	28	14	2	3	99	49	38	38
Missouri	0	0	0	1	0	0	1	1	53	41	42	50
North Dakota	0	0	0	0	0	0	0	1	58	8	20	17
South Dakota	0	0	0	0	45	6	1	1	90	12	20	18
Nebraska	4	1	0	0	4	1	0	1	34	9	5	12
Kansas	2.8	1	0	0	11	4	1	2	212	76	97	65
SO. ATL.												
Delaware	0	0	0	0	20	1	0	0	118	6	9	4
Maryland [2, 3]	3	1	1	2	6	2	0	1	74	24	14	32
Dist. of Col.	8	1	0	0	8	1	1	1	65	8	7	8
Virginia	4	2	0	0	1.9	1	2	3	60	32	34	35
West Virginia	2.7	1	2	0	8	3	1	4	124	46	86	79
North Carolina [3]	0	0	3	1	6	4	1	1	107	72	87	68
South Carolina [3]	0	0	1	0	8	3	1	0	14	5	11	7
Georgia [3]	0	0	0	0	10	6	2	0	40	24	20	20
Florida [3]	3	1	2	0	0	0	0	0	12	4	5	3
E. SO. CEN.												
Kentucky	1.7	1	1	1	12	7	0	3	75	43	66	66
Tennessee [3]	1.8	1	1	2	1.8	1	3	3	71	40	68	68
Alabama [3]	0	0	1	0	1.8	1	1	1	51	29	27	19
Mississippi [3]	0	0	0	0	2.5	1	0	0	15	6	17	15
W. SO. CEN.												
Arkansas [3]	0	0	0	0	5	2	0	0	22	9	20	7
Louisiana [3]	0	0	0	0	0	0	0	0	7	3	12	11
Oklahoma	4	2	0	1	8	4	0	1	18	9	33	19
Texas [3]	1.7	2	0	1	12	14	2	2	17	21	72	32
MOUNTAIN												
Montana	0	0	0	0	19	2	0	0	103	11	18	18
Idaho	10	1	0	0	0	0	0	0	41	4	1	3
Wyoming	0	0	0	0	22	1	0	0	65	3	12	12
Colorado	5	1	0	1	58	12	2	2	82	17	29	29
New Mexico	0	0	0	0	99	8	0	0	74	6	3	10
Arizona	12	1	0	0	0	0	0	0	49	4	4	5
Utah [3]	0	0	0	0	99	10	0	1	79	8	10	12
PACIFIC												
Washington	3	1	0	0	3	1	0	4	65	21	22	33
Oregon	0	0	0	0	5	1	0	2	94	19	42	36
California	1.6	2	0	0	34	42	1	18	68	83	96	120
Total	1.2	29	26	49	16	391	53	290	65	1,632	2,181	2,338
40 weeks	1.5	1,555	2,363	4,548	5	5,299	1,407	6,054	124	124,297	146,338	174,922

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 7, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases	1934–38, median	Oct. 7, 1939, rate	Oct. 7, 1939, cases	Oct. 8, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	3	3	42	7	18
New Hampshire	0	0	0	0	0	0	0	0	61	6	0
Vermont	0	0	0	0	0	0	2	1	416	31	34
Massachusetts	0	0	0	0	2	2	0	3	73	62	81
Rhode Island	0	0	0	0	0	0	1	0	122	16	24
Connecticut	0	0	0	0	9	3	4	2	71	24	44
MID. ATL.											
New York	0	0	0	0	7	17	19	21	114	286	354
New Jersey	0	0	0	0	8	7	3	8	73	61	162
Pennsylvania	0	0	0	0	8	15	26	29	114	225	217
E. NO. CEN.											
Ohio	0	0	0	0	18	24	16	34	76	99	49
Indiana	19	13	3	1	0	0	11	11	49	33	8
Illinois	0	0	5	1	14	21	17	27	129	197	344
Michigan [2]	0	0	0	0	7	7	6	9	43	41	151
Wisconsin	0	0	2	1	5	8	2	4	262	149	290
W. NO. CEN.											
Minnesota	2	1	0	0	0	0	1	1	99	51	32
Iowa	10	5	0	1	10	5	4	11	20	10	22
Missouri	0	0	0	1	14	11	7	16	19	15	10
North Dakota	0	0	0	1	0	0	5	3	190	26	85
South Dakota	0	0	0	0	0	0	1	1	30	4	0
Nebraska	0	0	0	0	0	0	4	0	19	5	2
Kansas	0	0	4	0	8	3	2	5	14	5	16
SO. ATL.											
Delaware	0	0	0	0	39	2	0	2	20	1	1
Maryland [2,3]	0	0	0	0	25	8	10	10	167	54	25
Dist. of Col.	0	0	0	0	0	0	3	1	113	14	5
Virginia	0	0	0	0	24	13	14	16	49	26	31
West Virginia	0	0	0	0	19	7	5	15	32	12	20
North Carolina [3]	0	0	0	0	4	3	6	14	69	47	108
South Carolina [3]	0	0	0	0	14	5	9	9	36	13	32
Georgia [3]	0	0	0	0	25	15	6	10	18	11	11
Florida [3]	0	0	0	0	3	1	1	0	9	8	13
E. SO. CEN.											
Kentucky	0	0	0	0	31	18	29	29	101	58	33
Tennessee [3]	0	0	0	0	11	6	7	24	56	32	27
Alabama [3]	0	0	0	0	5	3	9	9	60	34	39
Mississippi [2]	0	0	0	0	3	1	7	7	------	------	------
W. SO. CEN.											
Arkansas [3]	0	0	0	0	42	17	16	9	7	3	5
Louisiana [3]	0	0	0	0	29	12	12	12	7	3	19
Oklahoma	2	1	2	1	44	22	15	15	0	0	2
Texas [3]	0	0	0	0	41	49	23	30	32	39	65
MOUNTAIN											
Montana	0	0	7	7	9	1	7	3	9	1	23
Idaho	0	0	1	1	0	0	1	1	20	2	3
Wyoming	0	0	0	0	65	3	0	0	22	1	2
Colorado	43	9	2	1	39	8	2	4	48	10	15
New Mexico	0	0	0	0	86	7	9	13	99	8	9
Arizona	0	0	2	0	12	1	3	2	196	16	12
Utah [2]	0	0	0	0	30	8	2	1	328	33	27
PACIFIC											
Washington	0	0	3	3	25	8	9	2	34	11	37
Oregon	0	0	1	0	5	1	1	3	139	28	2
California	3	4	3	1	10	12	7	18	95	116	118
Total	1	33	35	33	14	344	347	484	78	1,920	2,577
40 weeks	9	8,846	12,967	6,286	10	10,504	11,620	12,221	145	143,682	167.172

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended October 7, 1939, 68 cases as follows: Maryland, 1; North Carolina, 2; South Carolina, 4; Georgia, 21; Florida, 1; Tennessee, 11; Alabama, 12; Arkansas, 1; Louisiana, 4; Texas, 11.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
August 1939										
Kentucky	60	18	39	7	6	4	15	120	1	199
Massachusetts	13		2	282	2	2	15	82	0	14
North Carolina	137		83	47	6	26	32	106	1	79
Rhode Island				93	0		1	5	0	2
September 1939										
Connecticut	5			28	0		12	38	0	13
Delaware	1			5	0		0	12	0	7
Iowa	21	1	20	21	0		35	96	17	18
Missouri	41		28	13	0	2	5	86	2	65
Pennsylvania	54			78	11		154	337	0	82
Tennessee	92	74	397	25	8	18	6	176	0	73
Wyoming	6			14	1		2	9	0	7

August 1939

	Cases
Chickenpox:	
Kentucky	7
Massachusetts	121
North Carolina	19
Rhode Island	9
Dysentery:	
Kentucky (amoebic)	3
Kentucky (bacillary)	79
Massachusetts (amoebic)	2
Massachusetts (bacillary)	12
North Carolina (bacillary)	2
Rhode Island (bacillary)	2
Encephalitis, epidemic or lethargic:	
Kentucky	1
Massachusetts	1
German measles:	
Massachusetts	16
North Carolina	8
Mumps:	
Kentucky	50
Massachusetts	83
Rhode Island	21
Ophthalmia neonatorum:	
Massachusetts	73
Rabies in animals:	
Massachusetts	3
Rhode Island	6
Rocky Mountain spotted fever:	
Kentucky	5
North Carolina	11
Septic sore throat:	
Kentucky	25
Massachusetts	5
North Carolina	7
Rhode Island	4
Tetanus:	
Massachusetts	3
Trachoma:	
Kentucky	57
Tularaemia:	
Kentucky	3
North Carolina	1
Typhus fever:	
North Carolina	15
Undulant fever:	
Kentucky	3
North Carolina	3

August 1939—Continued

	Cases
Vincent's infection:	
North Carolina	1
Whooping cough:	
Kentucky	188
Massachusetts	440
North Carolina	444
Rhode Island	125

September 1939

	Cases
Actinomycosis:	
Tennessee	1
Anthrax:	
Pennsylvania	2
Chickenpox:	
Connecticut	20
Delaware	2
Iowa	13
Missouri	7
Pennsylvania	193
Tennessee	14
Wyoming	5
Conjunctivitis, infectious:	
Connecticut	1
Dysentery:	
Connecticut (amoebic)	1
Connecticut (bacillary)	2
Iowa (bacillary)	1
Missouri (unspecified)	12
Pennsylvania (amoebic)	1
Pennsylvania (bacillary)	6
Tennessee (amoebic)	6
Tennessee (bacillary)	26
Encephalitis, epidemic or lethargic:	
Iowa	1
Missouri	12
Pennsylvania	3
Tennessee	1
German measles:	
Connecticut	3
Pennsylvania	30
Tennessee	3
Wyoming	1
Hookworm disease:	
Tennessee	1
Impetigo contagiosa:	
Tennessee	17
Mumps:	
Connecticut	47
Iowa	22
Missouri	13

September 1939—Continued

	Cases
Mumps—Continued.	
Pennsylvania	220
Tennessee	19
Wyoming	20
Ophthalmia neonatorum:	
Pennsylvania	7
Tennessee	4
Rabies in animals:	
Connecticut	1
Iowa	7
Missouri	2
Rabies in man:	
Tennessee	1
Rocky Mountain spotted fever:	
Missouri	2
Pennsylvania	1
Tennessee	7
Septic sore throat:	
Connecticut	11
Iowa	1
Missouri	3
Tennessee	10
Wyoming	5
Tetanus:	
Delaware	1
Missouri	3
Tennessee	1
Trachoma:	
Missouri	38
Tularaemia:	
Iowa	4
Missouri	6
Tennessee	5
Wyoming	2
Undulant fever:	
Connecticut	5
Delaware	1
Iowa	21
Missouri	4
Pennsylvania	5
Tennessee	2
Wyoming	1
Vincent's infection:	
Tennessee	9
Wyoming	1
Whooping cough:	
Connecticut	280
Delaware	39
Iowa	51
Missouri	100
Pennsylvania	1,281
Tennessee	124
Wyoming	32

WEEKLY REPORTS FROM CITIES

City reports for week ended September 30, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	154	69	18	158	352	509	3	333	75	988	--------
Current week[1]	82	31	10	131	300	341	0	313	40	894	--------
Maine:											
Portland	0	------	0	3	3	1	0	0	0	13	21
New Hampshire:											
Concord	0	------	0	0	1	0	0	1	0	0	16
Nashua	0	------	0	0	0	0	0	0	0	0	5
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	2	0	0	0	0	0	3	12
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	1	------	1	8	7	10	0	5	2	13	191
Fall River	1	------	0	0	1	0	0	0	0	2	25
Springfield	0	------	0	0	0	0	0	1	0	1	32
Worcester	1	------	0	1	5	1	0	2	0	10	49
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	20
Providence	1	------	0	15	0	1	0	2	0	24	52
Connecticut:											
Bridgeport	1	------	0	0	2	1	0	0	0	0	25
Hartford	0	------	0	0	1	0	0	0	0	28	40
New Haven	0	------	0	4	0	1	0	0	1	7	44
New York:											
Buffalo	0	------	0	0	5	3	0	8	0	10	105
New York	6	6	1	6	46	25	0	58	7	120	1,360
Rochester	1	------	0	1	5	1	0	0	1	2	61
Syracuse	0	------	0	0	1	0	0	2	0	20	51
New Jersey:											
Camden	0	------	0	0	2	0	0	0	1	4	37
Newark	0	------	0	2	4	6	0	1	2	25	87
Trenton	0	------	0	1	1	0	0	2	0	0	34
Pennsylvania:											
Philadelphia	1	2	1	5	9	22	0	17	1	91	417
Pittsburgh	4	1	1	1	9	19	0	9	1	12	175
Reading	0	------	0	0	0	0	0	0	0	3	18
Scranton	0	------	--------	0	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	15	------	0	0	1	12	0	7	0	13	111
Cleveland	2	9	0	1	10	9	0	13	1	53	160
Columbus	0	1	1	1	1	5	0	2	0	4	85
Toledo	0	------	0	5	5	5	0	2	1	27	63
Indiana:											
Anderson	0	------	0	0	0	2	0	0	0	0	7
Fort Wayne	0	------	0	0	0	1	0	0	0	0	18
Indianapolis	0	------	0	1	5	4	0	0	0	36	103
Muncie	0	------	0	0	1	3	0	1	0	0	13
South Bend	0	------	0	0	1	0	0	0	0	7	15
Terre Haute	0	------	0	0	1	0	0	0	0	0	22
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	11
Chicago	2	------	1	4	20	31	0	24	2	65	526
Elgin	0	------	0	0	0	1	0	0	0	3	4
Moline	2	------	0	0	0	0	0	0	0	1	12
Springfield	-------	------	--------	-------	-------	-------	-------	------	-------	--------	--------
Michigan:											
Detroit	2	------	0	4	8	30	0	20	1	38	216
Flint	0	------	0	0	1	1	0	1	0	5	19
Grand Rapids	0	------	0	1	2	11	0	0	0	2	28
Wisconsin:											
Kenosha	0	------	0	0	0	3	0	0	0	0	4
Madison	0	------	0	1	0	1	0	0	0	12	12
Milwaukee	0	------	0	0	2	21	0	2	0	17	108
Racine	0	------	0	1	0	1	0	0	0	5	11
Superior	1	------	0	0	0	1	0	0	0	0	8
Minnesota:											
Duluth	0	------	0	2	0	0	0	1	0	8	19
Minneapolis	3	------	0	2	5	18	0	0	0	15	96
St. Paul	0	------	0	0	5	8	0	2	0	46	48

[1] Figures for Springfield, Ill., estimated; report not received.

City reports for week ended September 30, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	2	0	------	0	0	------
Des Moines	7	------	0	0	0	7	0	0	0	0	39
Sioux City	0	------	------	1	------	0	0	------	0	0	------
Waterloo	2	------	------	0	------	2	0	------	0	2	------
Missouri:											
Kansas City	0	------	0	1	4	4	0	5	0	2	73
St. Joseph	0	------	0	1	2	0	0	2	0	0	22
St. Louis	2	------	0	0	7	10	0	9	1	11	174
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	0	15
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	1	0	0	0	0	0	0	5
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	1	------
Sioux Falls	0	------	0	0	0	4	0	0	0	0	8
Nebraska:											
Lincoln	0	------	------	0	------	0	0	------	0	2	------
Omaha	8	------	0	0	1	2	0	5	0	1	54
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	5
Topeka	0	------	0	0	1	4	0	0	0	0	16
Wichita	0	------	0	1	1	3	0	1	2	4	33
Delaware:											
Wilmington	0	------	0	0	3	0	0	1	0	6	23
Maryland:											
Baltimore	1	3	0	3	12	4	0	8	0	42	167
Cumberland	1	------	0	0	0	4	0	0	0	0	13
Frederick	0	------	0	0	0	1	0	0	0	0	5
Dist. of Col.:											
Washington	1	2	2	1	6	6	0	6	1	17	147
Virginia:											
Lynchburg	3	------	0	0	0	1	0	0	0	11	9
Norfolk	0	------	0	0	3	4	0	2	0	0	22
Richmond	1	------	0	0	2	3	0	0	0	1	43
Roanoke	0	------	0	0	1	0	0	1	0	0	8
West Virginia:											
Charleston	0	1	0	0	1	0	0	3	1	0	21
Wheeling	0	------	0	1	2	0	0	0	0	0	8
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	1	0	0	0	0	0	11
Wilmington	3	------	0	0	0	0	0	0	0	0	13
Winston-Salem	1	------	0	0	2	6	0	1	0	5	22
South Carolina:											
Charleston	1	1	0	0	0	0	0	1	0	0	17
Florence	0	3	0	0	0	0	0	0	2	1	6
Greenville	1	------	0	0	0	0	0	0	0	0	10
Georgia:											
Atlanta	0	7	0	0	5	0	0	5	1	0	69
Brunswick	0	------	0	0	1	0	0	0	0	1	3
Savannah	2	------	0	0	1	1	0	1	1	0	23
Florida:											
Miami	0	2	0	0	1	3	0	1	0	0	25
Tampa	0	------	0	0	1	0	0	1	0	0	22
Kentucky:											
Ashland	1	------	0	0	0	0	0	0	0	0	6
Covington	0	------	0	0	0	4	0	3	1	0	9
Lexington	0	------	0	0	0	0	0	0	0	2	16
Louisville	0	------	0	2	0	5	0	3	0	30	58
Tennessee:											
Knoxville	0	------	0	0	2	2	0	0	1	0	24
Memphis	1	------	0	1	4	3	0	4	0	7	93
Nashville	3	------	0	0	4	5	0	1	0	4	------
Alabama:											
Birmingham	0	------	0	0	5	2	0	3	0	3	58
Mobile	1	------	0	0	1	4	0	3	0	0	23
Montgomery	0	------	------	0	------	2	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	1	0	------	0	0	------
Little Rock	0	------	0	0	3	0	0	1	0	0	4
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	2	0	3
New Orleans	4	2	2	0	11	4	0	9	3	16	141
Shreveport	0	------	0	0	2	0	0	2	2	0	41
Oklahoma:											
Oklahoma City	0	------	0	0	1	1	0	0	2	0	31
Tulsa	0	------	------	0	------	0	0	------	0	0	------

City reports for week ended September 30, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Texas:											
Dallas	3	------	0	0	1	1	0	3	1	2	44
Fort Worth	0	------	0	0	3	5	0	1	0	0	31
Galveston	0	------	0	0	0	0	0	0	0	0	10
Houston	2	------	0	0	3	0	0	4	1	0	71
San Antonio	0	------	0	0	1	0	0	10	0	7	54
Montana:											
Billings	0	------	0	0	2	0	0	0	0	1	13
Great Falls	0	------	0	0	2	1	0	0	0	0	15
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	0	0	0	0	2	3
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	8
Colorado:											
Colorado Springs	0	------	0	0	0	1	0	0	0	0	5
Denver	3	------	0	2	3	1	0	0	0	1	64
Pueblo	0	------	0	0	0	0	0	2	0	2	7
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	2	1	2	10
Utah:											
Salt Lake City	0	------	0	0	0	1	0	1	0	19	23
Washington:											
Seattle	0	------	0	2	3	3	0	6	0	4	105
Spokane	0	------	0	4	1	8	0	1	7	2	30
Tacoma	0	------	0	40	1	2	0	0	0	1	32
Oregon:											
Portland	0	------	0	1	1	4	0	1	0	5	75
Salem	0	------	------	0	------	2	0	------	0	0	------
California:											
Los Angeles	3	2	0	7	21	18	0	24	0	11	559
Sacramento	0	------	0	0	2	1	0	1	0	3	34
San Francisco	1	------	0	8	10	6	0	9	0	3	178

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Vermont:			
Burlington	0	0	3
Rhode Island:			
Providence	1	0	0
New York:			
Buffalo	0	0	48
New York	0	0	13
Rochester	0	0	10
New Jersey:			
Camden	0	0	2
Newark	0	0	3
Trenton	0	0	1
Pennsylvania:			
Philadelphia	0	0	19
Pittsburgh	0	0	5
Scranton	1	0	0
Ohio:			
Cleveland	0	0	1
Toledo	0	0	8
Illinois:			
Chicago	0	0	7
Michigan:			
Detroit	1	0	33
Flint	0	0	2
Wisconsin:			
Milwaukee	0	0	1
Minnesota:			
Duluth	0	0	2
Minneapolis	0	0	15
Minnesota—Continued.			
St Paul	0	0	4
Iowa.			
Des Moines	0	0	3
Missouri.			
Kansas City	0	0	1
Nebraska.			
Lincoln	1	0	0
Maryland:			
Baltimore	0	0	2
District of Columbia:			
Washington	0	0	2
Florida:			
Tampa	1	1	0
Louisiana:			
New Orleans	2	0	0
Texas.			
Houston	0	0	2
Colorado:			
Colorado Springs	0	0	1
Denver	0	0	2
Pueblo	0	0	1
Utah:			
Salt Lake City	0	0	4
California:			
Los Angeles	0	0	14
Sacramento	0	0	2
San Francisco	0	0	4

Encephalitis, epidemic or lethargic.—Cases: New York, 4; Cleveland, 1; St. Louis, 2; Omaha, 1.
Pellagra.—Cases: Chicago, 1; Baltimore, 1; Charleston, S. C., 2; Florence, 2; Birmingham, 1.
Rabies in man.—Deaths: New Orleans, 1.
Typhus fever.—Cases: Atlanta, 2; Savannah, 2; Miami, 1; Tampa, 1; Mobile, 1; New Orleans, 2; Shreveport, 2; Dallas, 1; Fort Worth, 1; San Antonio, 1.

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended September 23, 1939.—During the 4 weeks ended September 23, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	11	2
Malaria	11	
Poliomyelitis	1	
Typhoid fever	24	3

Provinces—Notifiable diseases—4 weeks ended September 16, 1939.—During the 4 weeks ended September 16, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1		5	1	5	13
Chickenpox						4	4
Diphtheria	8	16				2	21
Hookworm disease						1	1
Leprosy				2			2
Lethargic encephalitis	1	3			1		5
Malaria	21	16	1	15	12	16	81
Measles				1		7	8
Poliomyelitis	2	5			1		8
Scarlet fever					4		4
Tuberculosis	17	64	29	21	27	50	208
Typhoid fever	32	53	18	37	19	51	210

ITALY

Communicable diseases—4 weeks ended July 16, 1939.—During the 4 weeks ended July 16, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	June 19–25	June 26–July 2	July 3–9	July 10–16
Anthrax	21	19	19	20
Cerebrospinal meningitis	16	19	23	19
Chickenpox	419	312	397	245
Diphtheria	370	307	360	411
Dysentery (amoebic)	25	14	15	22
Dysentery (bacillary)	1	2	5	9
Hookworm disease	21	51	54	23
Lethargic encephalitis	2	1		3
Measles	1,398	1,255	1,056	950
Mumps	275	217	218	192
Paratyphoid fever	61	80	87	95
Pellagra	12	24	18	16
Poliomyelitis	130	188	222	242
Puerperal fever	19	21	23	22
Rabies				1
Scarlet fever	253	196	152	186
Typhoid fever	304	326	423	530
Undulant fever	169	156	149	134
Whooping cough	595	498	651	710

JAPAN

Tokyo—Encephalitis, lethargic.—According to a report dated September 7, 1939, an outbreak of lethargic encephalitis has occurred in Tokyo, Japan, where 523 cases were reported from January 1 to September 3, 1939, inclusive. The mortality is said to be high, a total of 145 deaths having occurred from January 1 to September 2, 1939. The numbers of new cases of the disease reported since January 1 are as follows:

	Cases
January 1 to August 27	90
August 28	38
August 29	53
August 30	74
August 31	79
September 1	68
September 2	62
September 3	59

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of September 29, 1939, pages 1792-1806. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Ceylon—Batticaloa District.—During the week ended September 30, 1939, 2 cases of cholera were reported in Batticaloa District, Ceylon.

China.—During the week ended September 30, 1939, cholera was reported in China as follows: Hong Kong, 27 cases; Shanghai, 60 cases.

India—Delhi.—During the week ended September 30, 1939, 1 case of cholera was reported in Delhi, India.

Thailand—Bangkok.—During the week ended September 30, 1939, 1 case of cholera was reported in Bangkok, Thailand.

Plague

China—Manchuria.—A report dated August 26, 1939, states that up to the beginning of August 1939, 12 deaths from plague had occurred in the neighborhood of Kailu in the eastern part of Hsingan West Province, Manchuria. The report also states that up to August 15, 1939, cases of plague had been reported in Kirin Province as follows: Changling District, 11; Chengchiatun District, 15; Chienkuochi District, 25.

Hawaii Territory—Island of Hawaii—Hamakua District.—Rats proved positive for plague infection have been found in Hamakua District, Island of Hawaii, T. H., as follows: Hamakua Mill Sector, 1 rat, July 14; 1 rat, September 6; 1 rat, September 7; Paauhau Sector, 2 rats, July 13; 1 rat, September 2; 1 rat, September 14, 1939.

176190°—39——3

India—Calicut.—During the week ended September 30, 1939, 2 cases of plague were reported in Calicut, India.

Peru—Libertad Department—Trujillo Province.—During the month of August 1939, plague was reported in Trujillo Province, Libertad Department, Peru, as follows: Trujillo, 1 fatal case; Moche, 1 fatal case.

Smallpox

Venezuela.—During the period September 1-15, 1939, smallpox (alastrim) was reported in Venezuela as follows: Caracas, 6 cases, 1 death; La Asuncion, Nueva Esparta State, 1 case; San Juan de los Morros, Guarico State, 1 case.

Yellow Fever

Colombia—Antioquia Department—San Carlos.—On September 12, 1939, 1 death from yellow fever was reported in San Carlos, Antioquia Department, Colombia.

Dahomey—Bohicon.—On October 2, 1939, 1 suspected case of yellow fever was reported in Bohicon, Dahomey.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

September 10–October 7, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended October 7, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—For the 4 weeks ended October 7 there were 1,843 cases of poliomyelitis reported, as compared with 244, 2,615, and 1,027 cases for the corresponding period in 1938, 1937, and 1936, respectively. The current 4-week period contained the highest weekly incidence (501 cases, week ended September 16) during the recent rise of this disease, but by the end of the period (week ended October 7) the number of cases had dropped to the lowest weekly incidence (390 cases) in 7 weeks. A still further decline may now be expected.

Apparently every section of the country has felt the effects of the recent rise of this disease. In the South Atlantic region where the rise first appeared, the incidence is now about normal, and in the East South Central region the number of cases is also relatively low. All other regions reported very significant increases over the 1934–38 average incidence for this period. The largest number of cases was reported from the Middle Atlantic region, and all three of the States in that region contributed largely to the high incidence. In other regions individual States rather than the whole area seemed to be mostly responsible for the current excess incidence. States reporting the highest incidence during the current 4-week period are given in the following table:

	Cases		Cases
New York	430	Illinois	49
Michigan	210	Iowa	47
Minnesota	186	Ohio	42
California	174	New Mexico	40
Pennsylvania	155	Utah	30
New Jersey	93	Kentucky	30
Texas	49	Wisconsin	28
Colorado	49		

The year 1938 had the lowest incidence of poliomyelitis on record, and the present outbreak would be classed among the minor epidemics of this disease. In 1931, 1935, and 1937 there were more severe epidemics, with the cases for the period corresponding to the current one totaling 4,122, 2,528, and 2,615, respectively.

Smallpox.—The incidence of smallpox (125 cases) compared very favorably with the preceding 5-year average number of cases for this period. The highest incidence is still confined to States in the Central and Western regions. Except for a few occasional cases, the North and South Atlantic regions have been practically free of this disease. While the number of cases (9) in the South Atlantic region (7 of which occurred in West Virginia) is not high, it represents the highest incidence during this period in that region since 1931; the 1934–38 median figure is 1 case, and the 1932–38 average number for this period is only 3 cases.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Sept. 10–Oct. 7, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	2,296	3,309	3,309	1,835	2,653	1,955	2,128	3,033	3,031	103	113	212
New England	32	30	33	4	13	12	261	182	182	4	6	8
Middle Atlantic	113	154	200	34	59	58	281	389	523	17	28	44
East North Central	224	367	389	222	177	211	257	506	506	17	13	41
West North Central	113	228	228	53	117	148	141	397	189	9	10	17
South Atlantic	971	1,262	1,063	781	1,219	716	117	374	249	23	27	30
East South Central	431	616	616	115	265	156	88	121	121	11	18	25
West South Central	290	400	329	361	591	298	169	110	110	10	6	10
Mountain	64	106	75	187	136	82	160	274	208	9	4	6
Pacific	58	146	122	78	76	116	654	680	344	3	1	8
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	1,844	244	1,072	5,357	6,621	7,431	125	157	123	1,762	1,737	2,340
New England	47	11	21	215	286	382	0	0	0	31	38	44
Middle Atlantic	678	56	85	816	851	1,125	0	0	0	173	207	315
East North Central	342	54	280	1,576	2,148	2,312	35	25	25	379	238	380
West North Central	270	32	59	680	854	854	29	28	34	178	115	175
South Atlantic	78	32	83	790	839	849	9	1	1	273	357	525
East South Central	39	25	57	456	558	558	1	9	7	179	217	302
West South Central	65	11	20	181	341	212	14	9	9	385	341	368
Mountain	130	9	53	202	223	302	27	38	38	72	132	138
Pacific	186	14	109	441	521	521	10	47	22	92	92	92

[1] 48 States; Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City. [3] 47 States; Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—There were 2,296 cases of diphtheria reported for the 4 weeks ended October 7, as compared with 3,309, 2,849, and 2,248 cases for the corresponding period in 1938, 1937, and 1936, respectively. In the New England and Mountain regions the incidence stood at about the normal seasonal level, but all other regions reported significant decreases from the preceding 5-year average incidence.

Influenza.—The number of cases (1,835) of influenza reported for this period was relatively low. The East North Central, South Atlantic, West South Central, and Mountain regions reported slight excesses over the average seasonal incidence in those regions, but in other sections of the country the incidence was comparatively low.

Measles.—The incidence of measles was relatively low, the reported cases for the current period numbering 2,128, which was about 70 percent of the 1934–38 median figure for this period. The New England, West South Central, and Pacific regions reported more cases than might normally be expected, but in all other regions the incidence was below the average incidence for this period.

Meningococcus meningitis.—Reports indicate that this disease maintained a relatively low level. For the current 4-week period there were 103 cases reported, as compared with 113, 212, and 237 cases for the corresponding period in 1938, 1937, and 1936, respectively. Only one region, the Mountain, reported an excess of cases over the preceding 5-year average number for this period. The West South Central reported the average incidence but in all other regions the incidence was relatively low.

Scarlet fever.—Each section of the country contributed to the favorable situation of this disease that now exists. For the country as a whole there were 5,407 cases reported, which was about 80 percent of the number reported for the corresponding period in 1938, and about 70 percent of the 1934–38 median figure for this period. The most significant decrease was reported from the East North Central region—approximately 700 cases less than the average seasonal incidence.

Typhoid fever.—The number of cases (1,762) of typhoid fever reported for the current period was slightly higher than the number recorded for the corresponding period in 1938, but it was only about 75 percent of the preceding 5-year average number recorded for this period. The West South Central region alone reported an increase over the average seasonal incidence. In the North Central and Pacific regions the incidence was about normal, while each of the other 5 geographic regions reported a relatively low incidence.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended October 7, based on data received from the Bureau of the Census, was 10.1 per 1,000 inhabitants (annual basis). The average rate for the corresponding period in the 5 preceding years was also 10.1.

RECOVERY OF THE VIRUS OF POLIOMYELITIS FROM THE STOOLS OF HEALTHY CONTACTS IN AN INSTITUTIONAL OUTBREAK [1, 2]

By S. D. KRAMER, *Associated Director, Bureau of Laboratories, Division of Virology, State Department of Health, Lansing, Mich.*, A. G. GILLIAM, *Passed Assistant Surgeon, United States Public Health Service*, and J. G. MOLNER, *Director, School Health Service, Department of Health, Detroit, Mich.*

Since the times of Caverly, and more particularly of Wickman, a large mass of circumstantial evidence has been accumulated in support of the view that the poliomyelitis virus is widely distributed. These data are fairly consistent with the inference that in only a portion of those infected does the infection reach the level of clinical recognition.

Sufficient epidemiological and experimental evidence has been accumulated to suggest further the contact mode of transmission of the virus. Although this concept has been generally accepted by most workers in the field, various animals and insects have from time to time continued to be suggested as intermediary hosts or vectors.

The virus of poliomyelitis has been recovered from the upper respiratory and gastro-intestinal tracts of frank cases of the disease and from convalescents (*1*) with sufficient frequency to establish the fact that the virus may find egress from the human body through these channels. The virus has furthermore been recovered from the upper respiratory tract in instances of minor illnesses (*2*) associated with frank cases of the disease.

There has been, however, little effort expended to recover the virus from apparently healthy children and adults. Only three well-defined instances of such successful attempts have been recorded in the literature (*3*). Inasmuch as in outbreaks of poliomyelitis, carefully studied epidemiologically, only 20 to 30 percent of cases give evidence of prior direct or indirect association with cases and suspected cases of the disease, the virus is obviously spread from concealed sources. If these sources are human, and if transfer of infection is by human contact, then the concealed sources—which might be either mild illnesses or healthy carriers—must either outnumber

[1] From the laboratory of the Michigan Department of Health, the National Institute of Health, Washington, D. C., and the Detroit Department of Health.

[2] This work is supported by the National Foundation for Infantile Paralysis, Inc., and the Michigan Department of Health.

clinically recognizable cases, or must in some other manner be more effective in spreading infection than the definite cases.

With these considerations in mind, an epidemic in the Jewish Children's Home in Detroit was selected for study in an attempt to isolate virus from well persons. At the time of this outbreak, 34 children were cared for in the Home. Fourteen of these were of school age (5 to 16 years) and were permitted considerable freedom of movement within the Home and in its immediate neighborhood. The remaining 20 children were of infant and preschool ages and were kept in an entirely separate wing of the institution and had no direct contact with the older group, except as will be mentioned subsequently. In addition to the regular residents of the Home, approximately 250 neighborhood children used its facilities as a summer recreational center. These children had free association with the older children of the Home, but none with the infant and preschool group, except as will be mentioned later.

The chief circumstances which made this institution suitable for a search for virus among the well children were: (1) The high attack rate of clinical poliomyelitis among the preschool children, (2) the intimate association of these children within the Home (which was much closer than their contact with children outside the institution), and (3) the fact that they were under the continuous clinical supervision of a graduate nurse and a third-year medical student, and the almost daily observation of a pediatrician. It was felt that if the virus is often present in the human without any clinical manifestations, it might be recovered from the well persons in this institution.

Table 1 gives the ages and sexes of the infant and preschool group and of certain adult contacts which formed the major group studied, together with certain other data to be discussed later. It will be noted that the youngest infant was 2 months old and that 6 children were under 1 year of age. There were 5 between 1 and 2 years and 9 between 2 and 5 years. Males comprised 14 of the 20 children.

Between August 1 and August 8, 1939, five cases of poliomyelitis, one fatal and the others nonparalytic, developed in this group. These children were all hospitalized at the Herman Keifer Hospital and a diagnosis of poliomyelitis was established in all five patients from typical history, signs and symptoms, and spinal fluid findings. Three additional children, for whom no definite diagnosis could be established, had fever of 24 to 48 hours' duration. Table 1 includes a brief summarization of these cases.

TABLE 1.—*A group of 15 children and 8 adults exposed to 5 frank cases of poliomyelitis*

Name	Age[1]	Sex	Illness		First stool		Second stool	
			Nature	Date, 1939	Date, 1939	Result in monkey	Date, 1939	Result in monkey
A. P.	2 mo.	M	None.		Aug. 11	Died, dysentery, Aug. 19[2]		
F. G.	4 mo.	M	None.		Aug. 11	Polio (3)[2,3]		
P. G.	5 mo.	F	None.		Aug 11	Died, tuberculosis, Aug. 14[2]		
B. M.	5 mo.	F	None.		Aug 11	Polio (4)[3]		
D. G.	6 mo.	M	None.		Aug 11	Polio (4)[3]	Aug. 30	Polio (2).[3]
S. M.	11 mo.	M	Minor.	Aug. 4 to Aug. 5.	Aug 10	Polio (4)[2,3]	Aug. 29	Polio (2).[3]
S. F.	1 yr.	M	Minor.	Aug. 9 to Aug. 10.	Aug. 11	Polio (2)[2,3]	Aug. 27	Negative.
R. M. G.	16 mo.	F	Nonparalytic polio.	Aug. 7 to Aug. 14.		([4])		([4]).
R. G.	20 mo.	M	Minor.	Aug. 3.	Aug 11	Negative.		
R. C.	21 mo.	M	None.		Aug 11	Negative.	Aug. 29	Negative.
B. J.	21 mo.	F	None.		Aug 11	Negative[2]		
F. H.[5]	2 yr.	M.	Nonparalytic polio.	Aug. 8 to Aug. 13.		([4])		([4]).
M. G.	2 yr.	M	None.		Aug. 11	Died peritonitis, Aug. 14[2]		
D. H.[5]	3 yr.	F	None.		Aug 11	Negative.		
M. C.	3 yr.	F	None.		Aug 11	Negative.		
J. K.	3 yr.	M	Nonparalytic polio.	Aug 8 to Aug. 12.		([4])		([4]).
C. Z.[5]	3 yr.	M	Nonparalytic polio.	Aug. 1 to Aug. 9.		([4])		([4]).
S. R.[5]	3 yr.	M	Fatal polio.	Aug 5 to Aug. 8.		([4])		([4]).
R. R.[5]	4 yr.	M	None.		Aug 11	Died, peritonitis, Aug. 14[2]		
E. S.[5]	4 yr.	M	None.		Aug. 10	Negative[2]		
B. S.	14 yr.	F	None.		Aug 13	Negative.		
M. S.	24 yr.	M	Minor.	Aug. 10 to Aug 12.	Aug 10	Negative[2]	Aug. 25	Negative.
B. W.	24 yr.	F	None.		Aug 12	Negative.		
E. R.	25 yr.	F	None.		Aug 26	Negative.		
L. S.	28 yr.	F	Minor.	Aug. 14 to Aug. 19.	Aug. 11	Negative[2]		
C. C.	39 yr.	F	None.		Aug 12	Polio (2)[3]	Aug. 25	Negative.
S. F.	41 yr.	M	None.		Aug. 11	Negative[2]		
N. F.	45 yr.	F	None.		Aug 11	Negative.		

[1] Age attained on Aug. 1, 1939. The dates of birth for the children from whom virus was recovered are as follows: F. G., Mar. 14, 1939; B. M., Feb. 17, 1939; D. G., Jan. 7, 1939 S. M., Aug. 3, 1938; and S. F., July 13, 1938.

[2] This is one of the 12 stools which were treated with ether for only 24 hours. All other stools were ether-treated for longer periods, as mentioned on p. 1919.

[3] Numeral refers to number of successful monkey passages.

[4] Stools were not taken from the cases clinically poliomyelitis.

[5] Tonsil- and adenoidectomies: July 12—S. R. and R. R.; July 18—E. S. and D. H.; July 21—C. Z. and F. H.

Investigation of the circumstances under which contact might have occurred in the Home developed the following points of interest.

1. After July 23 the only contacts had by the group of infants and preschool children within the Home were with 17 adult attendants, 9 of whom were present daily and 8 of whom were present from 1 to 3 times a week. One child had been traveling with his mother by automobile in New York State from July 2 to 23. This child developed poliomyelitis on August 8.

2. Only one adult attendant was known to have had any association with poliomyelitis outside of the institution. This man (M. S.), a third-year medical student in temporary charge of the institution, had played ping-pong during the first week in July with an adult who developed fatal poliomyelitis on July 20. (Poliomyelitis virus was not recovered from the stool collected from M. S. on August 10.)

3. The preschool group played daily in a small playground enclosed by a wire fence, which in turn was surrounded by a large playground used by the older children in the Home. The latter was used also by neighborhood children, and by approximately 250 children who, during the summer months, used the facilities of the Home as a recreational center. Play between the older and younger children was forbidden, but on a number of occasions members of the two groups were observed to pass candy and other materials through the fence, and older children occasionally came in to use the preschool children's swings.

4. There were 4 cases of poliomyelitis reported within a radius of about 5 blocks of the Home. The dates of onset of illness in these cases were July 23, August 8, 12, and 17. A survey of 137 homes, selected at random in the same area, revealed cases of suspicious illnesses having onsets early in August but no other cases which could be definitely called poliomyelitis. Some of these children and members of their families played on the Jewish Children's Home playground. There were no cases of poliomyelitis reported in the 14 older children (5 to 16 years of age) at the Home, nor in the children who were registered in the summer recreational center.

5. Contact within the Home, among the infant and preschool group, was intimate. While sleeping and recreational space was more than ample, the contact was of the character expected in children of these ages. The infants were less exposed to the other members of the group than were the preschool children, but nevertheless they were intimately exposed through direct personal contact.

6. Only two of the adult attendants had any illness of any character during the period of the epidemic. One of these was M. S., the 24-year-old medical student, who from August 10 to 13 had a headache and vague pains in the neck and shoulder but no fever. The night nurse, L. S., a 28-year-old woman, had headache, diarrhea, nausea, and vomiting from August 14 to 19. Virus was not recovered from

stool specimens collected from M. S. on August 10 nor from L. S. on August 26.

7. All of the milk used in the institution came from one dairy, but that used on the infant and preschool side came in quart bottles, while that for the older children and adults was delivered in 5-gallon tins. Three infants (A. P., F. G., and P. G.) were fed canned or powdered milk only. (Virus was recovered from the stool of F. G.)

8. Between July 12 and 21 (see note, table 1), six of the preschool group had tonsil- and adenoidectomies performed. Three of the five cases of clinical poliomyelitis, including the fatal case, occurred in this group. The other three children with recent tonsil- and adenoidectomies failed to acquire the disease (*4*).

9. It is of interest to note that with few exceptions the infant and preschool groups were admitted to the Home from 2 weeks to 3 months after birth and thus spent nearly their entire lives in the institution.

10. In this outbreak of poliomyelitis, 5 of the 20 children developed the disease over a period of 1 week. By analogy, and as an illustration of epidemiological significance, it should be noted that in November 1938, chickenpox was introduced into the infant and preschool group. During a period of 38 days, all of the 16 children who then comprised this group developed the disease.

EXPERIMENTAL

Stools were obtained from the 15 remaining healthy infants and children of the preschool group. In addition, stools from 8 adults, who were in more or less intimate contact with the children, were also collected. The 8 adults included the day nurse (C. C.) and the third-year medical student (M. S.) immediately in charge of the group, both of whom were daily in intimate contact with all of the children. The remaining adults had less intimate and less continuous contact than did the doctor and nurse. Virus was recovered from the stools of 5 children and 1 adult. The stools of 2 of these children, collected 19 days later, again yielded the virus (secondary strains).

Collection and treatment of stools.—Five to thirty-five grams of stool were collected in sterile containers, promptly cooled, and transported in chilled thermos jugs to the laboratory within 24 to 48 hours.

Five to twenty grams (depending upon the quantity available) of each stool were weighed out, placed in a mortar, and thoroughly triturated as sterile distilled water was added. The ratio of stool to added water was 1 to 5. The macerated diluted feces was transferred to either large, heavy-walled test tubes or 250 cc. centrifuge bottles. These were tightly stoppered with sterile rubber stoppers, placed in a shaking machine, and shaken vigorously for 20 minutes. The containers were then balanced up in centrifuge cups and centrifuged for 15 minutes at about 1,500 r.p.m. Up to 60 cc. of the supernatant was

aspirated by suction into 100 cc. sterile glass-stoppered cylinders; several cubic centimeters of the supernatant were transferred to sterile test tubes to be used for intranasal instillations. To each of the cylinders containing the supernatant, 25 to 35 percent by volume of Squibb's White Label anesthetic ether was added and vigorously shaken for about 5 minutes, the stoppers partially removed to release ether pressure, restoppered, and all cylinders placed in the ice chest.

The first 12 specimens of stools investigated were treated in a somewhat different fashion from the specimens of stools received at a later date. No attempt was made to remove the ether from, or reduce the volume of, these 12 specimens. After 24 hours of treatment with ether the middle layers of these first 12 specimens were aspirated by suction and immediately inoculated into healthy animals by the method described below. The later specimens were permitted to stay in contact with ether in the ice box for at least another 24 hours, when small portions of the middle layer were aspirated for culture on blood plates. The following morning the blood plates were examined and gram stains were done on representative colonies. If more than 3 or 4 colonies appeared on any of the plates, the cylinder containing the corresponding feces was again cultured on blood plates and replaced in the ice chest until the following morning. Forty-eight to seventy-two hours were usually found sufficient to yield sterile plates or reduce the colonies to less than 3 per plate.

Removal of ether and concentration (applied to the later specimens of stool).—The relatively clear middle layer from each cylinder was transferred by suction into a 250 cc. centrifuge bottle and stoppered with a rubber stopper. The contents of each bottle was frozen in a thin layer in the lower half of the wall of the bottle. The freezing mixture employed was methyl cellosolve and dry ice. The solid-rubber stopper was then replaced with a sterile single-hole stopper containing a short piece of glass tubing and the bottle attached to a Mudd-Flosdorf lyophile apparatus. Desiccation of the material in the frozen state was carried on for about 4 or 5 hours. This was usually sufficient to remove essentially all the ether and reduced the volume by one-fifth to one-half. The bottles were then detached from the desiccating apparatus, stoppered with sterile, solid-rubber stoppers, and the frozen material permitted to melt. When completely melted, several loopfuls were removed from each bottle for culture on a blood plate, and the remainder inoculated into a healthy monkey.

Animal inoculation.—Healthy rhesus monkeys were used The untreated supernatant from the centrifuged stool suspensions was used for intranasal instillations (1 cc. instilled into each nostril). This was done within 24 hours of the time the supernatant was

obtained. The ether-treated supernatants, both unconcentrated and concentrated, varying in amounts from 10 to 25 cc., were injected directly into the peritoneal cavities through punctures in the shaved, iodinized, lower left quadrants of the abdomens.

Observation of the animals.—Rectal temperatures were taken twice daily and the animals exercised daily and closely observed for any deviation from their normal activity. When an animal showed an elevation in temperature, a lumbar or cistern tap was usually performed. With the appearance of temperature and partial (but definite) or complete paralysis of an extremity, the animal was sacrificed, sections of the cord removed for histological study, and 10 to 20 percent suspension of the cord immediately inoculated into a second monkey. A few of the animals which developed paralysis failed to show the characteristic temperature response. Inoculation into the second monkey generally followed the same pattern as that used for the first inoculation except that the intracerebral route was also used. One cc. of the cord suspension was instilled into each nostril for one or more consecutive days; 2 cc. were inocluated into the left or right frontal lobes, and 5 to 10 cc. were inoculated intraperitoneally into the lower left quadrant. These animals were similarly observed and lumbar taps performed when the animals showed an elevation of temperature; they were sacrificed when they showed partial or complete paralysis of one or more extremities.

Third, fourth, and fifth passages were carried out in three of the six recovered strains. Histological studies were made of all cords of animals sacrificed. Undiluted 5 or 10 percent suspensions of each of the strain cords were inoculated intracerebrally into six mice and two guinea pigs (0.03 cc. into mice and 0.3 cc. into guinea pigs).

Results.—The accompanying table shows the outcome of the experiments. Of the 23 stools received, 4 were lost when the animals died shortly after inoculation from causes other than poliomyelitis. All of these 4 animals had been inoculated with material from the first group of 12 stools which had been treated with ether for 24 hours only. Two of these animals died of peritonitis, 1 from dysentery, and the fourth died of a generalized tuberculosis.

The first two primary strains (first stool specimens) recovered came from two children who had had brief illnesses with indefinite symptoms, and were undiagnosed. The first child (S. F.) was a 1-year-old infant who showed an elevation of temperature on the 9th of August. The child appeared playful and his appetite was good. On the 10th of August the temperature was still 102° F. and returned to normal on the 11th. The second child (S. M.) was a 1-year-old infant who was sick for 1 day (August 4), 6 days before the stool specimen was obtained. Except for a slight sore throat and an elevation of temperature to 103° F. the child appeared quite normal. Of

the four remaining primary strains, three came from healthy infants (D. G., 7 months; F. G., 4 months; B. M., 5 months) who showed no evidence of illness or elevation of temperature during the period of observation (approximately 3 months). The sixth primary strain came from the stool of the day nurse (C. C.) in charge of the children and who had had no illness during the period of observation. Of the eight adults investigated in this study this nurse was unquestionably in the most intimate contact with all of the infants and preschool children.

All of the six primary strains have been passed through at least a second monkey and have presented the histological picture of experimental poliomyelitis. Three of the strains have already been subjected to fourth passages, yielding typical clinical and histological experimental poliomyelitis. The most virulent of the six recovered primary strains, and the one which has resulted in a type of poliomyelitis more typical of the experimental disease, as when stock virus is employed, came from contact D. G. The incubation period of this strain was relatively brief (9, 6, 6, and 7 days, respectively) and yielded more extensive paralysis than any of the other strains. None of the strains have given rise to illness in the inoculated mice or guinea pigs.

Second stools were obtained from four of the six healthy contacts (S. F., S. M., C. C., and D. G.; see table) from 2 to 3 weeks after the first stool. Two of these four (S. M. and D. F.) have resulted in clinical and histological poliomyelitis in the second passage, suggesting that these two children had continued to be active carriers for at least the interval between the stool collections (19 days).

The stools from three additional children (M. C., R. C., and B. J.) yielded what appeared to be poliomyelitis in animals in the first passage, but attempts to transmit the disease to a second animal were unsuccessful.

SUMMARY

In a section of a small institution, comprising 20 infants and preschool children from 2 months to 5 years of age, 1 fatal and 4 nonparalytic cases of poliomyelitis occurred. The clinical observation of all the children in the Home was excellent and included the routine recording of temperature twice daily.

Poliomyelitis virus was recovered from the stools of 3 out of 12 healthy children, contacts of these cases, and from an additional 2 out of 3 children who had had fever of 24 to 48 hours' duration. Thus, including the 5 clinical infections, which, however, were not examined for virus, 10 of the 20 children harbored poliomyelitis virus at some time in the 30-day period of August 1 to 30.

Virus was also recovered from the stool from one healthy adult out of specimens secured from eight adult attendants of the children. This individual, the day nurse in charge of the infant and preschool group, was undoubtedly more continuously and intimately associated with them than was any other adult.

In two children virus was again recovered from stools taken 19 days after the first positive stools were obtained from them. Thus, counting from the date of onset of the first case (August 1) to the date of collection of the last positive stool (August 30), the minimum limit in time in which the virus might have been present in some member of the group was 30 days.

It is noted that no case of poliomyelitis occurred in the children under 1 year of age, but that stools from three of five children in this group yielded virus.

Three of the five cases of poliomyelitis, including the one terminating fatally, were in children with recent tonsillectomies and adenoidectomies. There were, however, three other children with recent tonsillectomies and adenoidectomies who failed to acquire the disease in this heavily infected focus.

The facts developed in this institutional outbreak are consistent with a theory of transfer of infection by direct personal contact. Although they do not constitute conclusive proof of this, or of any other mode of spread, they do offer corroborative evidence of the concept that the virus of poliomyelitis is usually spread throughout the general population by the agency of healthy carriers.

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DIRECTORY OF STATE AND INSULAR HEALTH AUTHORITIES, JULY 1, 1939

In former years the Directory of State and Insular Health Authorities included whatever personnel were listed by each State or Territorial health officer at the time the information was collected for publication in the Public Health Reports. The Directory also included data as to appropriations and publications.

In the present directory only the personnel holding major administrative posts are listed, i. e., chiefs of departments, divisions, and bureaus, as well as all directors of special activities or functions. Members of the Board of Health, other than the health officer, are not included.

The information has been collected from the respective State and Insular health officers as of July 1, 1939. Where an officer has been reported to be a part-time employee, that fact is indicated by an asterisk (*). All periodicals and regular publications that were reported are included, but financial data are omitted.

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Publications:
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- Report of Bureau of Vital Statistics—yearly.
- Report of State Board of Health—yearly.

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Publications:
 Arizona Public Health News—monthly.

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 Biennial Report.

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 Bulletin, Division of Public Health Nurses—monthly.
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Connecticut Health Bulletin—monthly.
Annual Report of the State Department of Health.
Annual Vital Statistics Report.

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Annual Report.

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C. Alvin Dougan, M. D., director.
Vital Statistics, Bureau of:
M. Hester Lemon, registrar general.
Publications:
Annual Report Board of Health, Territory of Hawaii.

IDAHO DEPARTMENT OF PUBLIC WELFARE, DIVISION OF PUBLIC HEALTH

Boise

Director:
H. L. McMartin, M. D.
Industrial Hygiene:
A. F. Galloway, M. D., director.
Laboratories:
L. J. Peterson, B. S., director.
Local Health Service.
L. C. Krotcher, M. D., director.
Maternal and Child Health, and Crippled Children:
G. H. Bischoff, M. D., director.
Public Health Nursing:
Kathryn McCabe, R. N., director.
Sanitary Engineering:
W. V. Leonard, M. E., director.
Vital Statistics:
Mae G. Atwood, director.
Publications:
Public Welfare in Idaho—monthly.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH

Springfield

Director:
A. C. Baxter, M. D.
Child Hygiene and Public Health Nursing, Division of:
Grace S. Wightman, M. D., chief.
Maude Carson, R. N., supervisory nurse.
Communicable Diseases, Division of:
John J. McShane, M. D., chief.
Dental Health, Division of:
Charles F. Deatherage, D. D. S., chief.
Diagnostic Laboratories, Division of:
Howard J. Shaughnessy, Ph. D., chief.
District Health Administration, Division of:
Loren E. Orr, M. D., chief.
Hotel and Lodging House Inspection, Division of:
Michael J. Costello, superintendent.
Industrial Hygiene, Division of:
Milton H. Kronenberg, M. D., chief.
Pneumonia Control Officer:
Howard A. Lindberg, M. D.
Public Health Instruction, Division of:
Baxter Richardson, B. A., chief.
Sanitary Engineering, Division of:
Clarence W. Klassen, B. S., chief.
Statistical Research, Division of:
Lawrence A. Wilson, chief.
Venereal Disease Control Officer:
Herman Soloway, M. D.
Vital Statistics, Division of:
R. H. Woodruff, M. D., acting registrar.
Publications:
Illinois Health Messenger—biweekly.
Communicable Disease Cases, Statistics by Cities—weekly.
Communicable Disease Cases, Statistics by Counties—biweekly.
Digester (sewage)—quarterly.
Over the Spillway (water)—quarterly.
Time—Temperature (milk)—quarterly.
The Ole Swimming Hole—quarterly.
Department Report—yearly.

INDIANA DEPARTMENT OF COMMERCE AND INDUSTRIES—STATE BOARD OF HEALTH

Indianapolis

Director:
Verne K. Harvey, M. D., C. P. H.
Accounting, Bureau of:
D. S. McCready, chief.
Bacteriological Laboratory:
*Clyde G. Culbertson, M. D., chief.
Communicable Diseases, Bureau of:
J. W. Jackson, M. D., chief.
Dairy Products, Bureau of:
John Taylor, B. S., M. S., chief.
Dentistry, Bureau of:
Mary Westfall, D. D. S., chief.
Engineering, Bureau of:
B. A. Poole, B S., C. E., chief.
Food and Drugs, Bureau of:
H. V. Darnell, Ph. C., B. S., chief.
Health and Physical Education, Bureau of:
*Thurman B Rice, M. D , chief
Industrial Hygiene, Bureau of:
Louis Spolyar, M. D., chief.
Local Health Administration, Bureau of:
John W Ferree, M. D., M. P. H., chief.
Maternal and Child Health, Bureau of:
*Howard B. Mettel, M. D., chief.
Public Health Nursing, Bureau of:
Eva MacDougall, R. N., chief.
Venereal Diseases, Bureau of:
Geo. W. Bowman, M. D., chief.
Vital Statistics, Bureau of:
H M. Wright, chief.
Weights and Measures, Bureau of:
Rollin E Meek, chief.
Publications:
Monthly Bulletin.
Health Officers Digest—bimonthly.
Echoes - Public Health Nursing Bulletin—quarterly.

IOWA STATE DEPARTMENT OF HEALTH

Des Moines

Commissioner:
Walter L. Bierring, M. D.
Industrial Hygiene
Paul Houser, M. S., director.
Local Health Service:
Marvin F Haygood, M. D., C. P. H., director.
Maternal and Child Health:
John H. Hayek, M. D., director.
Preventable Disease:
Carl F Jordan, M. D., C. P. H., director.
Public Health Engineering:
A. H. Wieters, M. S , director.
Public Health Nursing:
Edith S. Countryman, R. N., director.
Tuberculosis Control:
Charles K McCarthy, M. D., director.
Venereal Disease Control:
R M Sorenson, M. D., M. P. H., director.
Vital Statistics:
Mayo Tolman, director.
Publications:
Weekly Health Message.
Public Health Bulletin—quarterly.
Special bulletins.
Biennial reports.

KANSAS STATE BOARD OF HEALTH

Topeka

Secretary:
F. P. Helm, M. D.
Communicable Diseases, Division of:
C. H. Kinnaman, M. D., epidemiologist.
Dental Hygiene:
Leon R. Kramer, D. D. S., director.
Food and Drug Division:
Thos. I Dalton, Ph C , assistant chief.
Maternal Health and Child Hygiene:
H R Ross, M D., director.
Public Health Education
Bertha Campbell, director.
Public Health Laboratories:
Charles A. Hunter, Ph. D., director.
Public Health Nursing:
Mary E. McAuliffe, R. N., director.
Sanitation, Division of:
Earnest Boyce, M. S., chief engineer.
Charles C. Dills, M. D., engineer in industrial hygiene.
Tuberculosis Control:
Clifton Hall, M. D , director.
Venereal Disease Control:
Robert H. Riedel, M. D., director.
Vital Statistics, Division of:
V. L. Bauersfeld, D. D. S., State registrar.
Publications:
Morbidity Report—weekly.
Kansas Health—weekly.
Radio releases—biweekly.
News Letter—monthly.
Kansas Accidental Deaths—yearly.
School Accident Report—yearly.
Motor Vehicle Report—yearly.
Biennial Report of Department.

KENTUCKY STATE DEPARTMENT OF HEALTH

Louisville

State Health Commissioner:
A. T. McCormack, M. D., D. P. H., D. S. C.
P. E. Blackerby, M. D., assistant State health commissioner.
Communicable Diseases, Division of:
F. W. Caudill, M. D., C. P. H., director.
County Health Work, Bureau of:
P. E. Blackerby, M. D., director.
Dental Health, Bureau of:
J. F. Owen, D. D. S., F. A. C. D., director.
Foods, Drugs, and Hotels, Bureau of:
Sarah V. Dugan, M. S., director.
Laboratory:
Lillian H. South, M. D., director.
Maternal and Child Health, Division of:
C. B. Crittenden, M. D., C. P. H., director.
Plumbing Division:
F. A. Perkins, chief inspector.
Public Health Education, Bureau of:
John W. Kelly, M. A., director.
Public Health Nursing, Bureau of:
Margaret L. East, R. N., director.
Registration, Bureau of:
John G. South, M. D., director.
Sanitary Engineering, Bureau of:
F. C. Dugan, B. C. E., C. E., State sanitary engineer.
Trachoma and Blindness, Bureau of:
Robert Sory, M. D., director.
Tuberculosis, Bureau of:
John B. Floyd, M. D., director.
Venereal Disease, Bureau of:
John R. Pate, M. D., director.
Vital Statistics, Bureau of:
J. F. Blackerby, Ph. G., State registrar.
Publications:
Service Sifter (news items)—monthly.
Bulletin, State Department of Health—monthly.
Report County Health Work—yearly.
Vital Statistics Bulletin—yearly.

LOUISIANA DEPARTMENT OF HEALTH

New Orleans

President, State Board of Health:
*Jos. A. O'Hara, M. D.
Animal Industry, Division of:
G. T. Jackson, D.V.S., director.
Crippled Children, Bureau of.
W. L. Treuting, M. D., director.
Education, Division of:
Branch J. Aymond, M. D., director.
Epidemiology, Bureau of:
*L. C. Brown, M. D., director.
Food and Drugs, Bureau of:
Cassius L Clay, analyst.
Laboratories, Bureau of.
*George H. Hauser, M. D., bacteriologist.
Parish Health Administration:
R. W. Todd, M. D., D. P. H., director.
Sanitary Engineering, Bureau of:
John H. O'Neill, sanitary engineer.
Sanitary Inspection, Division of:
P. A. Rohrs, chief inspector.
Tuberculosis Control, Bureau of:
R. Alex Brown, M. D., director.
Venereal Diseases, Bureau of:
Ford S. Williams, M. D., director.
Vital Statistics, Bureau of:
*P. A. Kibbe, M. D., director.
Publications:
Morbidity Report—twice weekly.
Quarterly Report.
Biennial Report.

MAINE DEPARTMENT OF HEALTH AND WELFARE—BUREAU OF HEALTH

Augusta

Director:
Roscoe L. Mitchell, M. D.
Communicable Diseases, Division of:
Roscoe L. Mitchell, M. D., director.
Crippled Children, Division of:
Herbert R. Kobes, M. D., director.
Dental Health, Division of:
Philip W. Woods, D. D. S., director.
Diagnostic Laboratories, Division of·
Arch H. Morrell, M. D., director.
Maternal and Child Health, Division of:
Robert E. Jewett, M. D., director.
Public Health Nursing, Division of:
Edith L. Soule, R. N , director.
Sanitary Engineering, Division of:
Elmer W. Campbell, D. P. H., director.
Social Hygiene, Division of:
Roscoe L. Mitchell, M. D., director.
Vital Statistics, Division of:
Parker B. Stinson, B. A., director.
Publications
Vital Statistics Report—yearly.

MARYLAND DEPARTMENT OF HEALTH

Baltimore

Director:
Robert H. Riley, M. D., D. P. H.
Bacteriology, Bureau of:
C A Perry, Sc. D., chief.
Chemistry, Bureau of:
William F. Reindollar, Sc. D., chief.
Child Hygiene, Bureau of:
J. H. Mason Knox, Jr., M. D., chief.
Communicable Diseases and Services for Crippled Children, Bureau of·
C. H. Halliday, M. D., chief and epidemiologist.
Food and Drug Commissioner:
A. L. Sullivan, B. S.
Legal Administration, Division of:
J. Davis Donovan, LL. B., chief.
Oral Hygiene, Division of:
Richard C. Leonard, D. D. S., chief.
Personnel and Accounts, Division of:
*Walter N. Kirkman, chief.
Public Health Education, Division of:
Gertrude B. Knipp, B A., chief.
Sanitary Engineering, Bureau of:
George L. Hall, B. S., chief.
Vital Statistics, Bureau of:
A. W Hedrich, Sc. D., chief.
Publications:
Annual Report.
Weekly News Letter.
Monthly Bulletin.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Boston

State Commissioner:
Paul J. Jakmauh, M. D.
Administration, Division of:
Paul J. Jakmauh, M. D., director.
*Edward G. Huber, M. D., assistant director, Public Health Administration.
Adult Hygiene, Division of:
Herbert L. Lombard, M. D., director.
Bacteriological Laboratory:
Edith A. Beckler, B. S., chief.
Biologic Laboratories, Division of:
Elliott S. Robinson, M. D., director and pathologist.
Child Hygiene, Division of:
M. Luise Diez, M. D., director.
Communicable Diseases, Division of:
Roy F. Feemster, M. D., director.
Crippled Children, Clinics for.
Paul Wakefield, M. D., supervisor.
Food and Drugs, Division of:
Hermann C. Lythgoe, B. S., director and analyst.
Genitoinfectious Diseases, Division of:
Nels A Nelson, M D., director.
Sanitary Engineering, Division of:
Arthur D. Weston, C. E., director and chief engineer.
Tuberculosis, Division of·
Alton S. Pope, M. D., director.
Wassermann Laboratory:
*William A Hinton, M. D., chief.
Publications:
The Commonhealth—quarterly.
News Letter to Boards of Health—bimonthly.
Bulletin of Genitoinfectious Diseases—monthly.

MICHIGAN DEPARTMENT OF HEALTH

Lansing

Commissioner:
H. Allen Moyer.
Education, Bureau of:
Marjorie Delavan, director.
Engineering, Bureau of:
E. D. Rich, C. E., director.
Epidemiology, Bureau of:
A. W. Newitt, M. D., director.
Finance, Bureau of:
Arnold J. Kirch, M. A., director.
Industrial Hygiene, Bureau of:
Kenneth E. Markuson, M. D., director.
Laboratories, Bureau of:
C. C. Young, D. P. H., director.
Local Health Service, Bureau of.
Albert McCown, M D., C. P. H., deputy commissioner in charge
Maternal and Child Health, Bureau of:
Lillian R. Smith, M. D., director.
Pneumonia, Division of.
A B Mitchell, M. D , director.
Public Health Dentistry, Bureau of:
W. R Davis, D D. S., director.
Public Health Nursing, Bureau of:
Helen Bean, R. N., M. A., director.
Records and Statistics, Bureau of:
Stuart T. Friant, director.
Venereal Diseases, Division of:
T. E. Gibson, M. D., director.
Publications.
Michigan Public Health—monthly.
Annual Report.
Statistical Report of Communicable Diseases—weekly.

MINNESOTA DEPARTMENT OF HEALTH

St. Paul

Secretary and Executive Officer:
A. J. Chesley, M. D.
Administration, Division of:
O. C Pierson, director.
Birth and Death Records and Vital Statistics, Division of:
Gerda C. Pierson, director.
Child Hygiene, Division of:
Viktor O. Wilson, M. D., C. P. H., director.
Dental Health Education:
Vern D. Irwin, D. D. S , superintendent.
Hotel Inspection, Division of.
Theo. T. Wold director.
Laboratories:
Lucy S Heathman, Ph. D., M. D., assistant director and chief.
Local Health Services:
R. N Barr, M. D., C. P. H., director.
Public Health Education:
Donald A. Dukelow, M. D., M. S., educational director.
Public Health Nursing, Division of:
Olivia T. Peterson, R. N , director.
Preventable Diseases, Division of:
O. McDaniel, M. D., director.
Sanitation, Division of.
H. A. Whittaker, B. A., director.
Venereal Disease Control:
Ralph R. Sullivan, M. D., assistant director.

MISSISSIPPI STATE BOARD OF HEALTH

Jackson

Executive Officer and Secretary:
Felix J. Underwood, M. D., F. A. C. P.
R N. Whitfield, M. D., assistant secretary.
County Health Work:
J. A. Milne, M. D., M. P. H., director.
Field Organizer:
Q Edward Gatlin.
Field Unit:
H B. Cottrell, M. D., C. P. H., supervisor.
Health Education
J. A. Milne, M. D , M. P. H., acting supervisor.
Eleanor Hassell, assistant supervisor.
Industrial Hygiene and Factory Inspection:
J. W. Dugger, M. D., director.
Laboratories
H C. Ricks, M. D., director.
Librarian:
Louise Williams.
Malaria Control:
George E. Riley, M. D., C. P. H., supervisor.
Maternal and Child Health:
J. A. Milne, M. D., M. P. H., acting director.
Milk Sanitation:
N M Parker, D. V. M., supervisor.
Mouth Hygiene:
Gladys Eyrich, B. L., supervisor.
Preventable Disease Control:
A. L. Gray, M. D., M. P. H., director.
Public Health Engineering:
H A Kroeze, C. E., director.
Public Health Nursing:
Mary D Osborne, R. N., supervisor.
Tuberculosis Diagnostic Unit:
D. L Anderson, M D., supervisor
Wm. D. Hickerson, M D., supervisor.
Tuberculosis State Sanatorium:
Henry Boswell, M D., F. A. C. P , director.
Venereal Disease Control.
D V Galloway, M. D., M. P. H., supervisor.
Vital Statistics
R. N. Whitfield, M. D., director.
Publications:
Biennial Report.
Health pamphlets—intervals.

MISSOURI STATE BOARD OF HEALTH

Jefferson City

State Health Commissioner:
H. F. Parker, M. D.
John W. Williams, Jr., M. D., C. P. H., assistant.
Business Administration:
W. H. Dorsey, business administrator.
Child Hygiene:
J. W. Chapman, M. D., director.
Health Education:
J. S. Rollins, LL. D., health educator.
Local Health Administration:
John W. Williams, Jr., M. D., C. P. H., director.
Public Health Dentistry:
A. O. Gruebbel, D. D. S., C. P. H., director.
Public Health Engineering:
W. S. Johnson, M. S., director.
Public Health Laboratories:
C. F. Adams, M. D., director.
Public Health Nursing:
Helena Dunham, R. N., director.
Vital Statistics:
Thos. W. Chamberlain, director.
Publications:
Morbidity Report—weekly.
Monthly Report.
Annual Report.

MONTANA DEPARTMENT OF PUBLIC HEALTH

Helena

Secretary and Executive Officer:
W. F. Cogswell, M. D.
Child Welfare, Division of:
Edythe P. Hershey, M. D., director.
Communicable Diseases, Division of:
B. K. Kilbourne, M. D., epidemiologist and director.
County Health Work:
B. K. Kilbourne, M. D., epidemiologist and director.
Food and Drugs, Division of:
J. W. Forbes, director.
Health Education:
Maud A. Brown, director.
Hygienic Laboratory:
Edith Kuhns, director.
Public Health Nursing:
Florence Whipple, R. N., supervisor.
Vital Statistics, Division of:
W. F. Cogswell, M. D., State registrar.
Water and Sewage, Division of:
H. B. Foote, sanitary engineer and director.
Publications:
Communicable Disease Report—weekly.
Report of Montana State Board of Health—biennial.

NEBRASKA DEPARTMENT OF HEALTH

Lincoln

Director of Health:
P. H. Bartholomew, M. D.
Community Sanitation:
Harry F. Glynn, assistant director.
Dental Hygiene, Division of:
J. R. Thompson, D. D. S., director.
Laboratory, Division of:
L. O. Vose, bacteriologist.
Maternal and Child Health, Division of:
R. H. Loder, M. D., director.
Public Health Engineer:
T. A. Filipi.
Public Health Nursing Consultant:
Eleanor Palmquist, R. N.
Tuberculosis, Survey of Human:
E. A. Rogers, M. D., director.
Venereal Disease, Division of:
E. G. Zimmerer, M. D., assistant epidemiologist.
Vital Statistics, Division of:
Jean Barrett, registrar.

NEVADA STATE BOARD OF HEALTH

Carson City

State Health Officer:
Edward E. Hamer, M. D.
Dental Hygiene, Bureau of:
Q. S. McCall, D. D. S., director.
Hygienic Laboratory, State:
Mrs. Vera E. Young, B. S., C. P. H., director.
Maternal and Child Health and Crippled Children, Division of:
H. Earl Belnap, M. D., director.
Nurse, State Supervisory:
Mrs. Christie Thompson, R. N.
Public Health Engineering, Division of:
W. W. White, E. M., C. P. H., director.
Venereal Disease Control, Division of:
*B. H. Caples, M. D., director.
Vital Statistics, Division of:
John J. Sullivan, Jr., B. A., M. P. H., vital statistician.
Publications:
Biennial Report of State Board of Health.

NEW HAMPSHIRE STATE BOARD OF HEALTH

Concord

Secretary and Executive Officer:
Travis P. Burroughs, M. D., C. P. H.
Crippled Children Services:
Mary M. Atchison, M. D., M. P. H., director.
Epidemiology and Local Health:
John S. Wheeler, M. D., C. P. H., director.
Laboratory of Hygiene, State:
Travis P. Burroughs, M. D., C. P. H., director.
Maternal and Child Health, Division of:
Mary M. Atchison, M. D., M. P. H., director.
Public Health Nursing, Division of:
Mary D. Davis, R. N., director.
Venereal Disease Control, Division of:
Alfred L. Frechette, M. D., M. P. H., director.
Chemistry and Sanitation, Division of:
Charles D. Howard, B. S., director.
Vital Statistics, Department of:
Travis P. Burroughs, M. D., C. P. H., registrar.
Publications:
New Hampshire Health News—monthly.
New Hampshire Registration Report—biennially.
Report of the State Board of Health—biennially.

NEW JERSEY DEPARTMENT OF HEALTH

Trenton

Director:
J. Lynn Mahaffey, M. D.
Administration, Bureau of:
Edmund R. Outcalt, chief.
Bacteriology, Bureau of:
John V. Mulcahy, Graduate in Chem., chief.
Chemistry, Bureau of:
John E. Bacon, Ch. E., chief.
Food and Drugs, Bureau of:
Walter W. Scofield, B. S., chief.
Local Health Administration, Bureau of:
William H. MacDonald, M. S., chief.
Maternal and Child Health, Bureau of:
Julius Levy, M. D., consultant.
Sanitary Engineering, Bureau of:
Harry P. Croft, C. E., chief.
Sanitary Milk Control, Division of:
I. H. Shaw, D. V. M., veterinarian.
Sanitary Shellfish Control, Division of:
Edwin G. Applegate, B. S., senior chemist.
Venereal Disease Control, Division of:
Karl M. Scott, M. D., acting chief.
Vital Statistics, Bureau of:
David S. South, registrar.
Publications:
Annual Report.
Public Health News—bimonthly.

NEW MEXICO DEPARTMENT OF PUBLIC HEALTH

Santa Fe

Director:
E. B. Godfrey, M. D.
County Health Work, Division of:
C. H. Douthirt, M D., director.
Maternal and Child Health:
Hester B Curtis, M. D., M. P. H., director.
Public Health Engineer:
Paul S. Fox, M. S. in C. E.
Public Health Laboratory:
Myrtle Greenfield, M. A., director.
Public Health Nursing:
Fannie Warncke, R. N., director.
Venereal Disease Control officer:
E. F. McIntyre, M. D., C. P. H.
Vital Statistics:
Billy Tober, registrar.
Publications
New Mexico Health Officer—quarterly.
Vital Statistics Bulletin—monthly.
Communicable Disease Report—weekly.

NEW YORK STATE DEPARTMENT OF HEALTH

Albany

Commissioner:
Edward S. Godfrey, M. D.
Paul B. Brooks, M. D., deputy commissioner.
Administrative Officer:
Edmund Schreiner, LL. B.
Administrative Finance Officer:
Clifford C. Shore.
Cancer Control, Division of:
Burton T. Simpson, M. D., director.
Communicable Diseases, Division of.
James E. Perkins, M. D., director.
Laboratories and Research, Division of.
Augustus B. Wadsworth, M. D., director.
Local Health Administration:
V. A Van Volkenburgh, M. D., assistant commissioner.
Maternity, Infancy and Child Hygiene, Division of:
Elizabeth M. Gardiner, M. D., director.
Orthopedics, Division of
Walter J Craig, M. D., director.
Pneumonia Control, Bureau of.
Edward S. Rogers, M. D., C. P. H., chief.
Preventable Diseases.
Ernest L. Stebbins, M. D., assistant commissioner.
Public Health Education, Division of:
Burt R. Rickards, B S., director.
Public Health Nursing, Division of:
Marion W. Sheahan, R. N., director.
Sanitation, Division of.
Charles A. Holmquist, B. S, director.
Syphilis Control, Division of:
William A. Brumfield, M. D., director.
Tuberculosis, Division of.
William Siegal, M. D, director.
Tuberculosis Hospitals
Robert E. Plunkett, M. D., general superintendent
Vital Statistics, Division of:
J. V. DePorte, Ph. D., director.
Publications.
Health News—weekly.
Vital Statistics Review—monthly.
Chats (Public Health Nurses)—monthly.
Annual Report.
District State Health Officers' Bulletin—monthly.

NORTH CAROLINA STATE BOARD OF HEALTH

Raleigh

Secretary and State Health Officer:
Carl V. Reynolds, M. D
G. M. Cooper, M. D., assistant State health officer.
County Health Work:
R. E. Fox, M. D., director.
Epidemiology and Venereal Disease Control, Division of:
J. C. Knox, M. D., director.
Health Education, State:
Walter Wilkins, M. D., coordinator.
Health Education, Crippled Children Work, and Maternal and Child Health Service, Division of.
G. M. Cooper, M. D., director.
Industrial Hygiene, Division of:
M. F. Trice, acting director.
Laboratories, Division of:
John H Hamilton, M. D., director.
Oral Hygiene, Division of:
Ernest A. Branch, D. D. S., director.
Sanitary Engineering, Division of:
Warren H. Booker, C. E., director.
Vital Statistics, Division of:
R. T. Stimpson, M. D., director.
Publications:
The Health Bulletin—monthly.
Vital Statistics Reports—yearly.
Biennial Report.

NORTH DAKOTA STATE DEPARTMENT OF HEALTH

Bismarck

State Health Officer:
Maysil M. Williams, M. D., C. P. H.
Child Hygiene, Division of:
August C. Orr, M. D., director.
Health Education:
Clare Gates, D. P. H., supervisor.
Laboratories, Division of:
Melvin E. Koons, M. S., C. P. H., director.
Local Health Work, Division of:
D. R. Gillespie, M. D., director.
Preventable Diseases, Division of:
John A. Cowan, M. D., director.
Public Health Nursing:
Margrete Skaarup, R. N., supervisor.
Sanitary Engineering, Division of:
Lloyd K. Clark, B. S. in C. E., B. S. in P. H. Engineering, director.
Vital Statistics, Division of:
Margaret D. Lang, B. S., director.
Publications:
Biennial Report.
Weekly News Release.

OHIO DEPARTMENT OF HEALTH

Columbus

State Director of Health:
  R. H. Markwith, M. D.
  James E. Bauman, LL. B., assistant.
Child Hygiene, Bureau of:
  A. W. Thomas, M. D., chief.
Communicable Disease, Division of:
  Finley Van Orsdall, M. D., chief.
Hospitals, Bureau of:
  Mrs. Clara E. Reeder, R. N., chief.
Laboratories, Division of:
  Leo F. Ey, chief.
Local Health Organization, Bureau of:
  R. W. DeCrow, M. D., chief.
Nutrition:
  Martha Koehne, Ph D., chief.
Occupational Diseases, Bureau of:
  K. D Smith, M. D , chief.
Plumbing, Bureau of:
  Richard Barrett, chief inspector.
Public Health Nursing, Division of:
  S. Gertrude Bush, O. P. H. N., R. N., chief.
Sanitary Engineering, Division of:
  Fred K. Waring, B. S. in S. E., B. S. in C. E., chief.
Tuberculosis, Bureau of:
  W. J. Smith, M. D., chief.
Venereal Disease Control, Bureau of:
  Neal D. Carter, M. D., acting chief.
Vital Statistics, Division of:
  I. C. Plummer, B. S., chief.
Publications:
  Ohio Health News—monthly.
  Ohio Industrial Hygiene Bulletin—monthly.
  Ohio Sanitarian—quarterly.
  Ohio Conference on Water Purification—yearly.
  Ohio Conference on Sewage-Treatment—yearly.
  Morbidity Statistics Bulletin—bi-monthly.

OKLAHOMA DEPARTMENT OF PUBLIC HEALTH

Oklahoma City

Commissioner:
  G. F. Mathews, M. D.
  J. P. Folan, assistant.
Environmental Sanitation:
  H. J. Darcey, B. S. Eng., director.
Epidemiology:
  E. A. Gillis, M. D., epidemiologist.
Laboratories.
  W. M. Hayes, D. P. H., director.
Local Health Service:
  J. W. Shackelford, M. D., M. P. H., director.
Malaria Control and Community Sanitation:
  Emil L. Baldwin, director.
Maternal and Child Hygiene.
  P. J. Collopy, M. D., director.
Milk Control:
  Wm. J. Wyatt, B. A., director.
Nursing Division:
  Myrtle J. Priddis, acting director.
Preventive Dentistry:
  F. P. Bertram, D. D. S., director.
Public Health Education:
  Hugh Payne, director.
Tuberculosis Control:
  R. H. Gingles, M. D., director.
Venereal Disease Control:
  Vance F. Morgan, M. D., director.
Vital Statistics, Bureau of:
  Jo. C. Rose, M. A., statistician.
Publications:
  Annual Report.

OREGON STATE BOARD OF HEALTH

Portland

State Health Officer:
  Frederick D. Stricker, M. D.
County Health Units, Division of:
  A. Edward Bostrom, M. D., director.
Maternal and Child Health, Division of:
  G. D Carlyle Thompson, M. D., director.
Oral Health, Division of:
  Floyd H. DeCamp, D. D. S., director.
Public Health Nursing, Division of:
  Olive M. Whitlock, R. N., director.
Sanitary Engineering, Division of:
  Carl E. Green, C. E., director.
State Hygienic Laboratory:
  William Levin, D. P. H., director.
Venereal Disease Control, Division of:
  Samuel D. Allison, M. D., director.
Publications:
  Bulletin—weekly.
  Biennial Report.

PENNSYLVANIA DEPARTMENT OF HEALTH

Harrisburg

Secretary:
  John J. Shaw, M. D.
  A. H. Stewart, M. D., deputy.
Accounts, Division of:
  E. J. MacNamara, chief.
Cancer Control.
  Stanley P. Reimann, M. D., chief.
Engineering, Bureau of:
  W. L. Stevenson, C. E., director.
Environmental Hygiene:
  James Chester Bell, C. E., chief.
Health Conservation, Bureau of:
  J. Moore Campbell, M. D., director.
Industrial Hygiene:
  William B. Fulton, M. D., chief.
Laboratories, Bureau of:
  Verner Nisbet, M. D., director.
Maternal and Child Health, Bureau of:
  Paul Dodds, M. D., director.
Milk Sanitation, Bureau of:
  Ralph E. Irwin, director.
Pneumonia Control:
  Dale C. Stahle, M. D., chief.
Public Health Nursing, Bureau of:
  Alice M. O'Halloran, R. N., director.
Supplies, Division of:
  Walter J. Heintzelman, chief.
Syphilis and Genitoinfectious Diseases:
  Edgar S. Everhart, M. D., chief.
Tuberculosis Clinics:
  S. J. Dickey, M. D., chief.
Vital Statistics, Bureau of:
  Frank P. Strome, M. D., director.
Publications:
  Pennsylvania's Health—monthly.

PUERTO RICO DEPARTMENT OF HEALTH

San Juan

Commissioner:
Eduardo Garrido Morales, M. D., D. P. H.
Antonio Arbona, M. D., assistant.
Pedro Malaret, M. D., assistant.
Biological Laboratory:
Oscar Costa Mandry, M. D., director.
Chemical Laboratory:
Rafael del Valle Sarraga, B. S., Ph. C., director.
Construction and Plumbing, Bureau of:
Jose Cantellops, S. E., chief.
Epidemiology and Vital Statistics, Division of:
Abel de Juan, M. D., C. P. H., chief.
Foods and Drugs:
Jose Rivera Mundo, Ph. C., chief.
General Sanitary Inspection:
W. F. Lippitt, M. D., chief.
Infant Hygiene, Bureau of:
Maria Robert de Romeu, M. D., chief.
Milk Supply, Divis on of:
F. Velez Lamela, chief.
Property and Accounts, Division of:
Rafael M. Mendez, Ph. G., chief.
Public Health Units.
Jose Chaves, M. D., medical director.
Rural Medical Dispensaries:
Ramon Berrios Berdecia, M. D., chief.
Sanitary Engineering:
Octavio Marcano, C. E., chief.
Social Welfare:
Beatriz Lassalle, S. W., chief.
Tuberculosis:
Jose Rodriguez Pastor, M. D., chief.
Venereal Diseases:
Ernesto Quintero, M. D., director.
Publications:
Puerto Rico Health Bulletin—monthly.
Report of the Commissioner of Health—yearly.

RHODE ISLAND DEPARTMENT OF PUBLIC HEALTH

Providence

Director:
Lester A. Round, Ph. D.
Communicable Disease Control:
Morris L. Grover, M. D., M. P. H., chief.
Crippled Children s Division:
*William A. Horan, M. D., chief.
Laboratory Division:
Edgar J Staff, M A., M. S., chief.
Maternal and Child Health:
Francis V. Corrigan, M. D., chief.
Narcotics and Pharmacy Division:
Joseph J. Cahill, acting chief.
Professional Examining Boards:
E. Clyde Thomas, acting chief.
Vital Statistics Division:
Genevieve Dolan, chief.
Publications:
Annual Report.
Registration Report—yearly.

SOUTH CAROLINA STATE BOARD OF HEALTH

Columbia

State Health Officer:
James A. Hayne, D. P. H., M. D.
Communicable Diseases, Department of:
G E McDaniel, M. D., director.
Crippled Children, Division of.
H. G. Callison, M. D
Hygienic Laboratory.
H. M. Smith, M. D., director.
Industrial Hygiene, Division of:
Harry F. Wilson, M D.
Maternal and Child Health, Division of:
R. W. Ball, M. D., director.
Rural Sanitation and County Health Work, Director:
Ben F. Wyman, M. D., director.
Venereal Disease Control:
Sedgwick Simons, M. D., director.
Vital Statistics, Bureau of:
M. B Woodward, M. D., director.
Publications:
Annual Report.

SOUTH DAKOTA STATE BOARD OF HEALTH

Pierre

State Health Officer:
J. F. D. Cook, M. D., F. A. C. S.
G. J. VanHeuvelen, M. D., C. P. H., assistant.
Crippled Children:
Myrtle Carney, M. D., acting director.
Maternal and Child Health:
Viola Russell, M. D., director.
Nurses:
Florence W. Englesby, R. N., chief consultant.
Sanitary Engineering:
W. W Towne, C. E., M. S., director.
Publications:
Vital Statistic Reports—monthly, yearly, biennial report.
Sanitary Engineering Department, The Clarifier—monthly.

TENNESSEE DEPARTMENT OF PUBLIC HEALTH

Nashville

Commissioner:
W. C. Williams, M. D., C. P. H.
R. H. Hutcheson, M. D., C. P. H., assistant.
Dental Hygiene Service:
P. E. Blackerby, Jr., D. D. S., director.
Field Technical Staff:
W. V. Sanford, M. D., C. P. H., director.
Industrial Hygiene Service:
Crit Pharris, M D., C. P. H., director.
Laboratories, Division of:
W. H. Gaub, M. S., C. P. H., director.
Local Health Service:
R. H. Hutcheson, M. D., C. P. H., director.
Maternal and Child Hygiene Service:
John M. Saunders, M. D., C. P. H., director.
Preventable Diseases, Division of:
L. L. Lumsden, M. D., director.
Public Health Nursing Service.
Frances F. Hagar, R. N., director.
Sanitary Engineering, Division of:
Howard D. Schmidt, B. E., director.
Statistical Service:
Ruth R. Puffer, B. A., director.
Tuberculosis Field Service:
R. S. Gass, M. D., director.
Tuberculosis Hospitalization Service:
W. W. Hubbard, M. D., director.
Vital Statistics, Division of:
J. J Wright, M. D., C. P. H., director.
Publications:
Health Briefs—monthly.
News Letter—monthly.
Monthly Morbidity Report.
Annual Report.
Biennial Report.
Vital Statistics Report.
Provisional Vital Statistics Report.
Morbidity Report.

TEXAS STATE DEPARTMENT OF HEALTH

Austin

State Health Officer:
Geo. W. Cox, M. D.
Dental Hygiene Work:
Ed. Taylor, D. D. S., director.
Food and Drugs:
F. D. Brock, Ph G., director.
Hygienic Laboratories:
S. W. Bohls, M. D., director.
Industrial Hygiene:
Carl A. Nau, M. D., director.
Local and County Health Work:
G. W. Luckey, M D., director.
J. W. E. H. Beck, M. D., director, local health service.
Malaria Control:
C. P. Coogle, M. D., director.
Maternal and Child Health:
J. M. Coleman, M. D., M. P. H., director.
Public Health Education:
L. E. Bracy, B. A., director.
Sanitary Engineering:
V. M. Ehlers, C. E., director.
Tuberculosis Control:
Howard E. Smith, M. D., director.
Venereal Disease Control:
A. M. Clarkson, M. D., C. P. H., director.
Vital Statistics:
W. A. Davis, M. D , State registrar.
Publications:
News Service—weekly.
Bulletin of State Department of Health—monthly
Monthly Report.
Quarterly Report.
Yearly Report.
Biennial Report.

UTAH STATE BOARD OF HEALTH

Salt Lake City

Acting State Health Commissioner:
William M. McKay, M. D., M. P. H.
Communicable Disease Control
William M. McKay, M. D., M. P. H., director.
Crippled Children:
Marcella McInnerny, R. N., director.
Dental Health:
R. C. Dalgleish, D. D. S., director.
Industrial Hygiene:
J. L. Jones, M. D., D. P. H., director.
Laboratories:
E. H. Bramhall, B. S., director.
Local Health Administration:
D. D. Carr, M. D., C. P. H., director.
Maternal and Child Health:
Lela J. Beebe, M. D., director.
Public Health Education:
D. C. Houston, B. S., M. B. A., director.
Public Health Nursing:
Lily Hagerman, R. N., C. P. H. N., director.
Sanitary Engineering:
Lynn M. Thatcher, B. S., director.
Venereal Disease Control:
Welby W. Bigelow, M. D., C. P. H., director.
Vital Statistics:
Eva W. Ramsey, director.
Publications:
Our Health—bimonthly.
Biennial report of the State Board of Health.
Communicable Disease Report—weekly.

VERMONT DEPARTMENT OF PUBLIC HEALTH

Burlington

Secretary and Executive Officer:
Chas. F. Dalton, M. D.
Crippled Children's Division:
Lillian Kron, R. N., director.
Laboratory of Hygiene:
Chas. F. Whitney, M. D., director.
Maternal and Child Health Division:
* P. D. Clark, M. D., director.
Public Health Nursing:
Nellie Jones, R. N., director.
Sanitary Engineering:
* Earle Waterman, C. E., director.
Tuberculosis Division:
H. W. Slocum, B. A., director.
Venereal Disease Division:
F. S. Kent, M. D., director.
Publications:
Crusader (TB)—monthly.

VIRGIN ISLANDS DEPARTMENT OF HEALTH

Charlotte Amalie

Commissioner of Health and Chief Municipal Physician, St. Thomas:
*Knud Knud-Hansen, M. D., F. A. C. S.

Assistant Commissioner of Health and Chief Municipal physician, St. Croix:
*Meredith Hoskins, M. D.
Municipal Physician and Administrator, St. John:
*George M. Hughes, M. D.

VIRGINIA DEPARTMENT OF HEALTH

Richmond

State Health Commissioner:
I. C. Riggin, M. D., Sc. D.
Communicable Diseases, Bureau of:
William Grossmann, M. D., director.
Crippled Children's Bureau:
Edgar C. Harper, M. D., director.
Health Education, Division of:
J. C. Funk, Sc. D., director.
Industrial Hygiene, Bureau of:
W. D. Tillson, M. D., director.
Laboratories, Bureau of:
Adah Corpening, director.
Maternal and Child Health, Bureau of:
B. B. Bagby, M. D., director.
Mouth Hygiene, Bureau of:
N. T. Ballou, D. D. S., director.
Public Health Nursing, Bureau of:
Mary I. Mastin, R. N., director.
Rural Health, Bureau of:
L. J. Roper, M. D., director.
Sanitary Engineering, Bureau of:
Richard Messer, C. E., director.
Tuberculosis Out-Patient Service:
Edgar C. Harper, M. D., director.
Venereal Disease Control, Division of:
Edward M. Holmes, M. D., director.
Vital Statistics, Bureau of:
Walter A. Plecker, M. D., director.
Publications:
Annual Report.
Virginia Health Bulletin—monthly.
Health talks syndicated in Virginia newspapers—weekly.

WASHINGTON STATE DEPARTMENT OF HEALTH

Seattle

State Director of Health:
Donald G. Evans, M. D., C. P. H.
R. H. Fletcher, M. D., M. P. H., assistant.
Epidemiology and Venereal Disease Control, Division of:
L. A. Dewey, M. D., D. P. H., chief.
Health Education, Division of:
Charles Hilton, M. A., chief.
Laboratories, Division of:
A. U. Simpson, M. D., chief.
Local Health Administration:
R. H. Fletcher, M. D., M. P. H., chief.
Maternal and Child Hygiene, Division of.
Percy F. Guy, M. D., M. P. H., chief.
Public Health Engineering, Division of:
Roy M. Harris, B. E., C. E., M. S., chief.
Public Health Nursing, Division of:
Anna R. Moore, R. N., chief.
Tuberculosis Control Health Officer
K. M. Soderstrom, M. D.
Vital Statistics, Division of:
Francis Dale Rhoads, M. A., State registrar.
Publications:
Communicable Disease Report—weekly.
Water Supply and Sewerage News—bimonthly.
Annual Report.

WEST VIRGINIA DEPARTMENT OF HEALTH

Charleston

Commissioner:
Arthur E. McClue, M. D.
Barbers and Beauticians, Bureau of:
E. L. Peters, director.
Communicable Diseases, Division of:
Albert M. Price, M. D., C. P. H., director.
County Health Work, Bureau of:
Thomas H. Blake, M. D., C. P. H., director.
Hygienic Laboratory, State:
Katharine E. Cox, director.
Industrial Hygiene, Bureau of:
John F. Cadden, M. D., C. P. H., director.
Maternal and Child Hygiene, Division of:
Thomas W. Nale, director.
Public Health Education and Public Relations, Bureau of:
Dorothea Campbell, director.
Public Health Nursing, Bureau of:
Mrs. Laurene C. Fisher, R. N., director.
Venereal Diseases, Bureau of:
Charles N. Scott, M. D., director.
Vital Statistics, Division of:
Franklin H. Reeder, M. B., director.
Publications:
Biennial Report.
Communicable Disease Report—weekly.
The Sanitarian—quarterly.
Community Sanitation Program Report—biweekly.

WISCONSIN STATE BOARD OF HEALTH

Madison

State Health Officer:
Cornelius A. Harper, M. D.
Carl N. Neupert, M. D., assistant.
Barber and Beauty Parlor Divisions:
Chas. E. Mullen, supervisor.
Communicable Disease:
H. M. Guilford, M. D., director.
Dental Education:
F. A. Bull, D. D. S., supervisor.
Hotel and Restaurant Division:
B. A. Honeycombe, supervisor.
Industrial Hygiene:
Paul A. Brehm, M. D., supervisor.
Maternal and Child Health:
Amy L. Hunter, M. D., director.
Public Health Nursing:
Cornelia van Kooy, R. N., supervisor.
Nursing Education:
Carrie May Dokken, R. N., acting supervisor.
Sanitary Engineering:
Louis F. Warrick, Ch. E., M. S., State sanitary engineer.
Venereal Disease Control Officer:
Milton Trautmann, M. D.
Vital Statistics:
Francis E. Kester, Ph. B., assistant registrar.
Publications:
Quarterly Bulletin.
Communicable Disease Report—weekly.
Biennial Report.

WYOMING DEPARTMENT OF PUBLIC HEALTH

Cheyenne

State Health Officer:
M. C. Keith, M. D.
Epidemiology:
N. H. Savage, M. D., director.
Maternal and Child Health, and Crippled Children:
Margaret Jones, M. D., director.
Sanitary Engineering.
L. O. Williams, Jr., B. S.
State Laboratory:
Philip R Carlquist, B. A., C. P. H., director.
Vital Statistics
Stanley G. Hanks, M. S., C. P. H., director.
Publications:
Report of Epidemiologist—weekly.
Health Department Bulletin—monthly.
Full Report of Health Department—biennial.

PROSECUTION OF PET SHOP OWNER FOR VIOLATION OF NEW YORK STATE SANITARY CODE

The Public Health Council of New York State established a regulation (Regulation 38, Ch. II, of the Sanitary Code), effective June 1, 1938, which prohibited the importation, breeding, or sale of birds of the parrot family within the State. The first prosecution under the provisions of this regulation occurred in July 1939, in Nassau County. In order to establish a precedent of the enforcement of the regulation, a representative of the health department, in the presence of witnesses, purchased a parrot in a pet shop, and evidence of the sale was presented to the district attorney's office. The pet shop proprietor was arrested and taken before the county district court. When confronted with the evidence the defendant pleaded guilty and was sentenced to 6 months in jail. Representatives of the State and county departments of health recommended leniency, and the sentence was suspended with the warning that if, in the future, there was any evidence of the presence of birds of the parrot family in the shop, the suspension would be revoked and the sentence enforced.

In order to facilitate prosecution of any future violations of this regulation in New York State, it was considered desirable to include in the regulation prohibition of the "offer" of birds of this family for sale. The health department recommended that the regulation be thus amended, and the Public Health Council adopted the amendment, effective October 1, 1939.

Federal regulations restricting the importation and interstate shipment of birds of the parrot family, aimed at preventing the spread of psittacosis in the United States, have been in effect for almost 10

years. On January 24, 1930, an Executive Order (No. 5264) was issued, and in accordance with this order the Secretary of the Treasury, on recommendation of the Surgeon General of the Public Health Service, issued regulations governing the importation of parrots. These regulations have since been revised to include all birds of the parrot family, and to require each commercial importation of such birds to be accompanied by a certificate from the duly constituted sanitary authority at the place of origin to the effect that the particular birds in the shipment, to the best of the knowledge and belief of the sanitary authority, originated from an aviary or other distribution establishment free from psittacosis infection, as determined by such inspection and laboratory examination as may be necessary. Commercial shipments of such birds are held in quarantine at certain designated ports for a 6-month period in order to enable the quarantine officer to make certain that the birds are free from psittacosis.

The interstate quarantine regulations prohibit the transportation of psittacine birds in interstate commerce unless the birds are at least 8 months old and are accompanied by a certificate of health issued by the health authority of the State of origin stating that to the best of his knowledge they are from a source free from psittacosis infection.

The States of New York and Connecticut and the cities of Baltimore, Md., and Pittsburgh, Pa., prohibit the importation of all psittacine birds, while California, Maine, Minnesota, and Oregon prohibit the importation of parrakeets.

State and Federal regulations have apparently been effective in curbing the spread of psittacosis in the United States, as indicated by a sharp decrease in the number of cases of this disease reported to the Public Health Service during the past few years. While 76 cases were reported during 1932, only 4 cases were reported during each of the years 1937 and 1938.

DEATHS DURING WEEK ENDED OCTOBER 7, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 7, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,366	7,740
Average for 3 prior years	7,840 [1]	
Total deaths, first 40 weeks of year	331,461	324,749
Deaths under 1 year of age	476	525
Average for 3 prior years	536 [1]	
Deaths under 1 year of age, first 40 weeks of year	20,056	21,115
Data from industrial insurance companies:		
Policies in force	66,619,958	68,290,970
Number of death claims	10,554	11,480
Death claims per 1,000 policies in force, annual rate	8.3	8.8
Death claims per 1,000 policies, first 40 weeks of year, annual rate	10.1	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (---) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Oct. 14, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median
NEW ENG.												
Maine	12	2	1	1	------	------	1	1	12	2	4	8
New Hampshire	0	0	0	0	------	------	------	------	162	16	0	2
Vermont	13	1	0	1	------	------	------	------	80	6	1	1
Massachusetts	6	5	1	2	------	------	------	------	51	43	39	24
Rhode Island	0	0	0	1	------	------	------	------	53	7	0	3
Connecticut	3	1	2	2	------	------	7	1	27	9	12	12
MID. ATL.												
New York	6	16	18	23	[1] 1	[1] 2	[1] 8	[1] 8	18	45	68	66
New Jersey	15	13	10	10	14	12	17	8	12	10	9	10
Pennsylvania	10	20	35	36	------	------	------	------	12	24	66	66
E. NO. CEN.												
Ohio	34	44	30	39	18	24	------	22	16	21	9	35
Indiana	31	21	29	29	------	------	13	17	16	11	14	14
Illinois	15	23	46	46	1	2	6	6	12	19	13	13
Michigan [3]	16	15	10	16	10	9	------	------	19	18	36	26
Wisconsin	2	1	0	5	44	25	63	25	23	13	66	33
W. NO. CEN.												
Minnesota	6	3	5	5	4	2	4	------	16	8	79	13
Iowa	22	11	17	7	------	------	------	------	14	7	13	4
Missouri	18	14	32	43	------	------	20	39	6	5	15	15
North Dakota	0	0	6	2	------	------	5	------	15	2	81	2
South Dakota	15	2	2	0	8	1	------	------	240	32	11	1
Nebraska	4	1	5	4	------	------	1	------	4	1	4	4
Kansas	6	2	7	8	8	3	1	1	73	26	3	8
SO. ATL.												
Delaware	20	1	0	0	------	------	------	------	20	1	2	2
Maryland [3]	25	8	4	8	34	11	7	7	19	6	25	4
Dist. of Col.	49	6	6	10	------	------	------	------	0	0	3	1
Virginia [3]	116	62	104	72	109	58	106	------	9	5	11	11
West Virginia	56	21	19	35	30	11	9	10	5	2	0	11
North Carolina [4]	103	141	165	124	------	------	1	4	47	32	44	20
South Carolina [4]	107	39	24	23	590	216	210	132	8	3	2	2
Georgia [4]	81	49	54	32	27	16	44	------	12	7	3	0
Florida	24	8	10	11	3	1	------	------	6	2	1	1

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Oct. 14, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median
E. SO. CEN.												
Kentucky	35	20	50	50	5	3	9	9	24	14	7	27
Tennessee [4]	60	34	51	49	12	7	37	19	11	6	1	2
Alabama [4]	53	30	56	44	40	23	23	22	9	5	4	4
Mississippi [2]	46	18	21	20	--	--	--	--	--	--	--	--
W. SO. CEN.												
Arkansas	47	19	32	29	42	17	10	10	2	1	22	1
Louisiana [4]	41	17	19	19	5	2	5	5	0	0	7	2
Oklahoma	20	10	24	11	87	43	28	26	0	0	1	1
Texas [4]	28	34	58	58	116	140	53	64	31	37	15	15
MOUNTAIN												
Montana	140	15	3	1	--	--	4	21	608	65	57	22
Idaho	0	0	0	1	10	1	5	4	71	7	24	3
Wyoming	0	0	0	0	--	--	--	--	458	21	1	1
Colorado	48	10	19	11	29	6	26	--	19	4	6	11
New Mexico	0	0	15	3	--	--	--	--	12	1	8	14
Arizona	49	4	9	2	491	40	27	12	0	0	4	2
Utah [2]	10	1	0	0	--	--	1	--	70	7	6	5
PACIFIC												
Washington	0	0	0	0	--	--	--	--	771	250	18	18
Oregon	0	0	3	0	35	7	8	13	50	10	5	5
California [4]	9	11	25	31	4	5	10	20	34	42	173	36
Total	30	753	1,027	1,027	32	687	769	595	34	853	988	988
41 weeks	16	16,284	20,333	20,333	179	155,313	50,717	107,576	348	352,687	766,491	674,351

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	6	1	0	2	12	2	7	15
New Hampshire	0	0	0	0	0	0	0	0	10	1	1	2
Vermont	0	0	0	0	67	5	0	0	94	7	7	6
Massachusetts	2.4	2	0	1	5	4	0	4	49	42	60	69
Rhode Island	0	0	0	0	0	0	0	0	23	3	5	9
Connecticut	8	1	0	1	12	4	2	2	53	18	20	20
MID. ATL.												
New York	0.8	2	4	7	24	61	5	11	50	124	121	179
New Jersey	1.2	1	1	0	11	9	4	4	57	48	48	45
Pennsylvania	2.5	5	3	3	18	35	0	7	82	161	176	174
E. NO. CEN.												
Ohio	0.8	1	2	2	5	6	1	18	131	171	221	221
Indiana	1.5	1	0	2	7	5	0	3	88	59	94	94
Illinois	0.7	1	3	4	5	7	1	16	81	123	218	218
Michigan [2]	2.1	2	4	2	43	41	3	18	152	144	233	156
Wisconsin	7	4	0	0	16	9	0	7	130	74	90	113
W. NO. CEN.												
Minnesota	0	0	0	0	60	31	1	3	118	61	53	53
Iowa	2	1	1	1	24	12	1	2	113	56	29	49
Missouri	0	0	1	1	1.3	1	0	3	58	45	95	95
North Dakota	0	0	0	0	0	0	0	0	80	11	23	26
South Dakota	0	0	0	0	8	1	0	1	203	27	11	13
Nebraska	0	0	0	0	8	2	0	1	31	8	6	16
Kansas	6	2	0	0	6	2	0	3	143	51	91	62

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Oct. 14, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	138	7	8	7
Maryland [3]	0	0	1	2	9	3	0	2	93	30	23	37
Dist. of Col.	0	0	0	1	0	0	1	1	32	4	10	10
Virginia [3]	1.9	1	0	1	1.9	1	1	1	71	38	45	45
West Virginia	0	0	2	2	5	2	0	1	183	68	63	84
North Carolina [4]	0	0	3	1	7	5	1	2	120	82	80	80
South Carolina [4]	0	0	1	1	30	11	0	0	55	20	0	9
Georgia [4]	3	2	0	0	1.7	1	1	2	75	45	32	31
Florida	3	1	0	1	0	0	1	1	12	4	8	8
E. SO. CEN.												
Kentucky	0	0	4	1	23	13	1	4	108	62	71	71
Tennessee [4]	1.8	1	3	3	4	2	0	3	85	48	52	52
Alabama [4]	4	2	1	1	0	0	1	1	77	44	25	17
Mississippi [3]	0	0	0	0	0	0	0	2	48	19	19	15
W. SO. CEN.												
Arkansas	0	0	2	0	2.5	1	3	1	22	9	25	15
Louisiana [4]	0	0	1	1	0	0	0	1	34	14	18	11
Oklahoma	2	1	0	0	4	2	0	0	20	10	27	19
Texas [4]	1.7	2	2	1	7	8	0	2	26	31	51	37
MOUNTAIN												
Montana	0	0	0	0	0	0	0	2	225	24	22	22
Idaho	0	0	0	0	41	4	0	0	112	11	17	17
Wyoming	0	0	0	0	44	2	1	0	109	5	2	6
Colorado	0	0	1	0	53	11	3	1	106	22	20	20
New Mexico	0	0	0	0	235	19	0	0	99	8	9	9
Arizona	0	0	0	0	86	7	0	0	49	4	1	8
Utah [3]	0	0	0	0	109	11	0	0	99	10	8	11
PACIFIC												
Washington	0	0	0	0	3	1	1	4	105	34	28	33
Oregon	0	0	2	0	25	5	0	2	50	10	45	25
California [4]	0.8	1	0	1	25	30	4	25	67	82	98	128
Total	1.4	34	42	49	15	375	37	263	79	1,981	2,416	2,668
41 weeks	1.5	1,589	2,405	4,605	6	5,674	1,444	6,294	123	126,278	148,754	177,590

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases
NEW ENG.											
Maine	0	0	0	0	12	2	0	2	471	78	32
New Hampshire	0	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0	255	19	46
Massachusetts	0	0	0	0	0	0	0	2	96	82	83
Rhode Island	0	0	0	0	0	0	0	0	38	5	27
Connecticut	0	0	0	0	12	4	2	1	205	69	41
MID. ATL.											
New York	0	0	0	0	8	20	8	15	94	234	338
New Jersey	0	0	0	0	4	3	4	5	104	87	162
Pennsylvania	0	0	0	0	10	20	26	27	103	202	188

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Oct. 14, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases	1934–38, median	Oct. 14, 1939, rate	Oct. 14, 1939, cases	Oct. 15, 1938, cases
E. NO. CEN.											
Ohio	0	0	0	0	6	8	7	22	180	234	125
Indiana	3	2	16	1	9	6	3	8	80	54	25
Illinois	0	0	1	1	12	19	15	24	117	179	380
Michigan [2]	0	0	0	0	4	4	7	11	117	111	187
Wisconsin	2	1	0	1	2	1	1	1	244	139	237
W. NO. CEN.											
Minnesota [3]	0	0	3	3	0	[5] 0	4	2	130	67	34
Iowa	0	0	2	2	4	2	6	10	24	12	13
Missouri	0	0	0	0	9	7	16	18	13	10	34
North Dakota	0	0	0	1	0	0	6	2	44	6	16
South Dakota	0	0	2	1	0	0	0	0	38	5	2
Nebraska	0	0	0	0	4	1	1	1	4	1	5
Kansas	0	0	0	0	22	8	4	4	20	7	19
SO. ATL.											
Delaware	0	0	0	0	0	0	1	2	59	3	5
Maryland [2]	0	0	0	0	12	4	15	15	71	23	21
Dist. of Col.	0	0	0	0	16	2	5	2	210	26	16
Virginia [3]	0	0	0	0	7	4	10	13	37	20	8
West Virginia	0	0	0	0	13	5	12	17	46	17	14
North Carolina [4]	1	1	0	0	13	9	18	15	80	55	90
South Carolina [4]	0	0	0	0	27	10	8	11	52	19	43
Georgia [4]	0	0	0	0	13	8	8	11	15	9	10
Florida	0	0	0	0	6	2	4	1	6	2	11
E. SO. CEN.											
Kentucky	0	0	0	0	24	14	15	29	78	45	19
Tennessee [4]	0	0	0	0	26	15	5	12	49	28	21
Alabama [4]	0	0	1	0	2	1	4	5	33	19	17
Mississippi [2]	0	0	0	0	10	4	5	5	------	------	------
W. SO. CEN.											
Arkansas	2	1	0	0	22	9	22	8	45	18	10
Louisiana [4]	0	0	0	0	19	8	8	8	126	52	9
Oklahoma	4	2	1	1	44	22	8	9	4	2	2
Texas [4]	0	0	2	0	22	27	38	28	30	36	32
MOUNTAIN											
Montana	0	0	4	4	28	3	3	5	75	8	13
Idaho	0	0	1	0	0	0	3	3	31	3	5
Wyoming	0	0	0	0	22	1	0	0	0	0	2
Colorado	5	1	1	0	39	8	10	9	48	10	29
New Mexico	0	0	0	0	86	7	1	12	247	20	7
Arizona	0	0	4	0	25	2	4	3	86	7	10
Utah [2]	0	0	0	0	0	0	0	0	576	58	9
PACIFIC											
Washington	0	0	1	5	6	2	10	8	34	11	24
Oregon	0	0	2	2	5	1	1	2	80	16	9
California [4]	2	3	1	0	15	18	13	13	68	83	122
Total	([6])	11	42	48	12	291	341	435	89	2,191	2,552
41 weeks	9	8,857	13,009	6,309	10	[5] 10,725	11,961	12,636	144	145,873	169,724

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended Oct. 14, 1939: Virginia, 1 case.
[4] Typhus fever, week ended Oct. 14, 1939, 79 cases as follows: North Carolina, 2; South Carolina, 11; Georgia, 24; Tennessee, 16; Alabama, 14; Louisiana, 3; Texas, 7; California, 2.
[5] The number of cases of typhoid fever in Minnesota for the week ended Sept. 30, 1939, should have been given as 2 instead of 72 as shown in the Public Health Reports for Oct. 13, p. 1867.
[6] Less than one-half of 1 per 100,000.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
July 1939										
Puerto Rico	48	16	1,010	12	1		2	0	0	49
August 1939										
Idaho	0		1	8	2		1	3	1	9
September 1939										
Arkansas	76	14	724	25	1	46	5	42	1	76
California	49	36	54	212	1	7	192	297	12	40
Maine	9	3		40	0	1	0	27	0	10
New Jersey	8	14	1	32			121	123	0	35
South Dakota	12	17		18			2	44	8	5
Texas	142	249	888	171	3	97	55	118	1	243
West Virginia	57	27	1	13	8		6	178	9	73

	Cases
July 1939	
Puerto Rico:	
Chickenpox	34
Dysentery	21
Leprosy	1
Mumps	1
Ophthalmia neonatorum	1
Puerperal septicemia	6
Tetanus	15
Tetanus, infantile	2
Whooping cough	98
August 1939	
Idaho:	
Chickenpox	12
German measles	2
Mumps	7
Rabies in animals	1
Whooping cough	12
September 1939	
Anthrax:	
California	1
Texas	1
Chickenpox:	
Arkansas	6
California	235
Maine	25
New Jersey	60
South Dakota	20
Texas	24
West Virginia	23
Dengue:	
Texas	21
Dysentery:	
Arkansas (amoebic)	2
Arkansas (bacillary)	8
California (amoebic)	17
California (bacillary)	97
New Jersey (bacillary)	2
Texas (amoebic)	10
Texas (bacillary)	131
***September 1939*—Continued**	
Dysentery—Continued.	
West Virginia (bacillary)	10
Encephalitis, epidemic or lethargic:	
Arkansas	1
California	16
New Jersey	3
Texas	6
West Virginia	5
Food poisoning:	
California	89
German measles:	
California	37
Maine	2
New Jersey	17
Granuloma, coccidioidal:	
California	4
Jaundice, epidemic:	
California	64
Leprosy:	
Texas	1
Mumps:	
Arkansas	10
California	547
Maine	17
New Jersey	139
South Dakota	22
Texas	58
West Virginia	5
Ophthalmia neonatorum:	
Arkansas	1
California	1
New Jersey	9
Puerperal septicemia:	
Arkansas	1
Rabies in animals:	
Arkansas	7
California	26
New Jersey	35
Relapsing fever:	
California	5
Texas	2
***September 1939*—Continued**	
Rocky Mountain spotted fever:	
New Jersey	1
Septic sore throat:	
Arkansas	31
California	8
New Jersey	11
West Virginia	4
Tetanus:	
Arkansas	3
California	12
Maine	1
New Jersey	1
Tularaemia.	
Arkansas	7
California	2
Texas	16
Typhus fever:	
New Jersey	1
Texas	102
Trachoma:	
Arkansas	73
California	9
Texas	5
Trichinosis:	
Arkansas	5
California	5
Undulant fever:	
California	22
Maine	4
New Jersey	2
North Dakota	2
Texas	38
Vincent's infection:	
Maine	1
Whooping cough:	
Arkansas	16
California	406
Maine	105
New Jersey	441
South Dakota	20
Texas	233
West Virginia	34

CASES OF VENEREAL DISEASES REPORTED FOR AUGUST 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,308	4.52	316	1.20
Arizona	232	5.63	158	3.83
Arkansas	1,110	5.42	370	1.56
California	3,146	5.11	1,720	2.79
Colorado	124	1.16	59	.55
Connecticut	191	1.10	92	.53
Delaware	232	8.89	70	2.68
District of Columbia	511	8.15	328	5.23
Florida	2,250	13.47	174	1.04
Georgia	1,750	5.67	32	.10
Idaho	29	.59	16	.32
Illinois	2,492	3.05	1,638	2.08
Indiana	489	1.41	133	.38
Iowa	269	1.05	145	.57
Kansas	331	1.78	127	.68
Kentucky	903	3.09	447	1.53
Louisiana	704	3.30	64	.30
Maine	34	.40	31	.36
Maryland	1,060	6.31	381	2.27
Massachusetts	367	.83	432	.98
Michigan	1,632	2.14	616	1.28
Minnesota	274	1.03	238	.90
Mississippi	2,805	13.86	2,627	12.99
Missouri	657	1.65	231	.58
Montana	57	1.06	44	.82
Nebraska	67	.49	62	.45
Nevada	65	6.44	28	2.77
New Hampshire	21	.41	2	.04
New Jersey	964	2.22	292	.67
New Mexico	169	4.00	50	1.18
New York	4,618	3.56	2,315	1.79
North Carolina	2,510	7.19	459	1.31
North Dakota	28	.40	30	.42
Ohio	1,137	1.69	446	.66
Oklahoma	902	3.54	238	.93
Oregon	105	1.02	119	1.16
Pennsylvania	1,444	1.42	138	.14
Rhode Island	117	1.72	47	.69
South Carolina	1,320	7.04	304	1.62
South Dakota	19	.27	34	.49
Tennessee	968	3.35	443	1.53
Texas	2,771	4.49	980	1.59
Utah	13	.25	43	.83
Vermont	13	.34	14	.37
Virginia	1,405	5.19	360	1.33
Washington	266	1.60	355	2.14
West Virginia	281	1.51	156	.84
Wisconsin	45	.15	155	.53
Wyoming	36	1.53	10	.43
Alaska	6	.96	29	4.63
Hawaii	60	1.48	59	1.46
Total	41,617	3.21	17,637	1.37

Reports from cities of 200,000 population or over

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Akron, Ohio	47	1.71	37	1.35
Atlanta, Ga	340	11.32	85	2.83
Baltimore, Md	688	8.24	285	3.41
Birmingham, Ala	307	10.43	63	2.14
Boston, Mass	142	1.79	154	1.94
Buffalo, N. Y	85	1.41	71	1.18
Chicago, Ill	2,402	6.55	1,638	4.47
Cincinnati, Ohio	181	3.83	112	2.37
Cleveland, Ohio	180	1.91	119	1.26
Columbus, Ohio	56	1.79	4	.13
Dallas, Tex	337	11.09	162	5.33
Dayton, Ohio	50	2.26	18	.81
Denver, Colo	61	2.02	35	1.16
Detroit, Mich	532	2.93	312	1.72
Houston, Tex	357	9.96	149	4.16
Indianapolis, Ind	13	.34	34	.88
Jersey City, N. J	25	.77	17	.52
Kansas City, Mo.[1]				
Los Angeles, Calif.[1]				
Louisville, Ky	258	7.61	99	2.92
Memphis, Tenn	239	8.18	142	4.86
Milwaukee, Wis.[1]				
Minneapolis, Minn	55	1.10	67	1.34
Newark, N. J	244	5.37	144	3.17
New Orleans, La.[1]				
New York, N. Y	3,486	4.65	1,708	2.28
Oakland, Calif	62	1.98	71	2.27
Omaha, Nebr	23	1.03	12	.54
Philadelphia, Pa	437	2.18		
Pittsburgh, Pa.[1]				
Portland, Oreg	33	1.03	48	1.50
Providence, R. I	51	1.96	20	.77
Rochester, N. Y	31	.91	43	1.26
St. Louis, Mo.[1]				
St. Paul, Minn	40	1.39	27	.94
San Antonio, Tex.[1]				
San Francisco, Calif	178	2.58	268	3.89
Seattle, Wash	115	2.97	110	2.84
Syracuse, N. Y.[1]				
Toledo, Ohio	45	1.45	4	.13
Washington, D. C	511	8.15	328	5.23

[1] No reports received from Kansas City, Mo., Los Angeles, Milwaukee, New Orleans, Pittsburgh, St. Louis, San Antonio, or Syracuse.

WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 7, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	170	76	21	180	387	611	4	336	67	946	-------
Current week [1]	99	45	14	193	255	358	1	282	33	717	-------
Maine:											
Portland	0	-----	0	0	0	0	0	0	0	6	22
New Hampshire:											
Concord	0	-----	0	3	2	0	0	0	0	0	8
Manchester	0	----	0	0	1	0	0	0	0	0	12
Nashua	0	----	0	0	0	0	0	0	0	0	4
Vermont:											
Barre	0	-----	0	0	0	0	0	0	0	0	2
Burlington	0	----	0	0	0	0	0	0	0	0	12
Rutland	0	-----	0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	0	----	0	6	11	15	0	4	1	15	182
Fall River	1	----	0	0	1	0	0	2	0	2	25
Springfield	0	------	0	0	0	1	0	0	0	1	25
Worcester	0	------	0	0	1	0	0	0	0	11	30
Rhode Island											
Pawtucket	0	-----	0	0	0	1	0	0	0	0	11
Providence	0	----	1	15	2	3	0	0	0	10	60
Connecticut											
Bridgeport	0	----	0	0	0	1	0	1	0	0	17
Hartford	0	----	0	0	0	1	0	2	0	6	33
New Haven	0	1	0	2	1	3	0	0	1	2	29
New York.											
Buffalo	0	----	0	1	3	7	0	5	0	8	154
New York	12	4	1	12	44	23	0	66	5	92	1,244
Rochester	0	----	0	0	0	0	0	1	0	4	53
Syracuse	0	----	0	0	3	2	0	0	0	16	45
New Jersey:											
Camden	0	----	0	0	0	5	0	1	0	0	22
Newark	1	----	0	1	4	4	0	4	1	19	76
Trenton	0	-----	0	0	0	1	0	4	0	0	39
Pennsylvania:											
Philadelphia	2	-----	0	3	11	12	0	17	3	78	398
Pittsburgh	2	----	0	1	12	5	0	7	0	14	163
Reading	1	----	0	0	0	0	0	0	0	0	19
Scranton	0	---	-----	0	---	3	0	------	0	0	-------
Ohio:											
Cincinnati	18	-----	0	0	2	9	0	3	0	7	------
Cleveland	3	8	0	2	11	24	0	5	1	60	154
Columbus	0	1	1	0	1	3	0	1	0	0	83
Toledo	0	------	0	1	4	21	0	5	1	4	59
Indiana:											
Anderson	0	-----	0	0	0	1	0	0	0	1	10
Fort Wayne	0	-----	0	0	0	2	1	0	0	0	22
Indianapolis	3	------	0	0	2	5	0	4	0	13	78
Muncie	0	-----	0	0	0	1	0	0	0	0	6
South Bend	0	------	0	0	0	0	0	0	0	0	20
Terre Haute	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Illinois:											
Alton	2	------	0	0	0	1	0	0	0	0	9
Chicago	6	2	0	5	16	44	0	32	5	73	622
Elgin	0	------	0	0	0	1	0	0	0	0	4
Moline	1	------	0	2	0	1	0	0	0	1	6
Springfield	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Michigan:											
Detroit	2	------	1	3	7	41	0	11	1	35	234
Flint	0	------	0	1	2	4	0	1	0	0	27
Grand Rapids	0	------	0	2	0	1	0	1	0	0	26
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	7	7
Madison	1	------	0	1	1	3	0	0	1	7	6
Milwaukee	0	1	1	1	3	17	0	3	0	16	93
Racine	0	------	0	1	0	2	0	0	0	1	11
Superior	0	------	0	0	0	1	0	0	0	0	5

[1] Figures for Terre Haute, Springfield, and Boise estimated; reports not received

City reports for week ended Oct. 7, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	-----	0	0	0	0	0	1	0	0	19
Minneapolis	0	-----	0	0	0	6	0	0	0	23	86
St. Paul	0	-----	0	0	4	5	0	1	0	25	44
Iowa:											
Cedar Rapids	0	-----	-----	0	-----	1	0	-----	0	2	-----
Davenport	0	-----	-----	0	-----	1	0	-----	0	1	-----
Des Moines	3	-----	0	1	0	13	2	0	0	0	26
Sioux City	0	-----	-----	1	-----	2	0	-----	0	3	-----
Waterloo	5	-----	-----	1	-----	4	0	-----	0	0	-----
Missouri:											
Kansas City	0	-----	0	3	4	10	0	4	0	2	91
St. Joseph	0	-----	0	0	0	1	0	1	0	0	21
St. Louis	4	-----	0	0	1	8	0	4	0	9	200
North Dakota:											
Fargo	1	-----	0	0	2	0	0	0	0	0	7
Grand Forks	0	-----	-----	0	-----	0	0	-----	0	1	-----
Minot	0	-----	0	0	0	0	0	0	0	0	5
South Dakota:											
Aberdeen	0	-----	-----	0	-----	0	0	-----	0	0	-----
Sioux Falls	0	-----	0	0	0	7	0	0	0	0	9
Nebraska:											
Lincoln	0	-----	-----	0	-----	0	0	-----	0	1	-----
Omaha	0	-----	1	0	2	1	0	1	0	2	70
Kansas:											
Lawrence	0	-----	0	0	0	0	0	0	0	0	6
Topeka	0	-----	0	0	3	3	0	1	0	0	22
Wichita	0	-----	0	2	3	4	0	2	0	1	37
Delaware:											
Wilmington	0	-----	0	0	1	0	0	0	0	1	12
Maryland											
Baltimore	0	1	1	1	4	1	0	6	1	49	174
Cumberland	0	-----	0	0	1	1	0	1	0	0	11
Frederick	0	-----	0	0	0	1	0	0	0	0	3
Dist. of Col.:											
Washington	3	-----	0	0	10	8	0	8	0	14	153
Virginia:											
Lynchburg	7	-----	0	0	1	0	0	0	1	3	15
Norfolk	1	-----	0	0	0	2	0	1	0	1	7
Richmond	1	-----	1	0	4	5	0	2	1	0	38
Roanoke	1	-----	0	0	0	2	0	1	1	0	12
West Virginia:											
Charleston	0	-----	0	0	0	0	0	0	0	0	20
Huntington	3	-----	-----	0	-----	0	0	-----	1	0	-----
Wheeling	0	-----	0	1	0	1	0	0	0	2	20
North Carolina:											
Gastonia	0	-----	-----	0	-----	0	0	-----	0	0	-----
Raleigh	3	-----	0	0	0	1	0	0	0	1	13
Wilmington	1	-----	0	0	0	0	0	0	0	0	9
Winston-Salem	0	-----	0	1	1	7	0	2	1	0	23
South Carolina:											
Charleston	0	9	1	0	1	0	0	3	1	0	29
Florence	1	6	0	2	1	0	0	0	0	1	12
Greenville	0	-----	0	0	0	0	0	0	0	0	11
Georgia:											
Atlanta	1	11	0	0	3	2	0	7	0	0	74
Brunswick	0	-----	0	0	1	0	0	0	0	1	4
Savannah	3	3	0	0	0	0	0	2	0	0	28
Florida:											
Miami	0	1	1	0	2	1	0	3	0	0	27
Tampa	0	-----	0	0	0	1	0	0	0	0	24
Kentucky:											
Ashland	0	-----	0	0	0	0	0	0	0	0	4
Covington	0	-----	0	0	3	0	0	3	0	0	22
Lexington	1	-----	0	0	1	0	0	1	0	0	16
Tennessee:											
Knoxville	5	-----	1	0	0	3	0	0	0	0	27
Memphis	0	-----	2	0	2	1	0	2	0	9	74
Nashville	3	-----	0	1	2	2	0	2	0	5	36
Alabama:											
Birmingham	0	-----	0	0	3	4	0	3	0	0	68
Mobile	1	-----	0	0	0	2	0	1	1	0	28
Montgomery	2	1	-----	0	-----	2	0	-----	0	0	-----
Arkansas:											
Fort Smith	0	-----	-----	0	-----	0	0	-----	0	0	-----
Little Rock	0	-----	-----	0	4	0	0	2	0	0	-----

City reports for week ended Oct. 7, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	1
New Orleans	5	1	1	3	11	2	0	12	2	1	146
Shreveport	0	------	0	0	4	0	0	1	0	0	52
Oklahoma:											
Oklahoma City	1	1	0	0	4	1	0	1	0	0	44
Tulsa	0	------	------	0	------	1	2	------	0	0	------
Texas:											
Dallas	6	------	0	1	2	3	0	4	0	0	59
Fort Worth	1	------	0	0	0	4	0	0	0	1	24
Galveston	0	------	0	0	1	0	0	1	0	0	17
Houston	1	------	0	0	7	0	0	2	1	0	86
San Antonio	0	------	2	0	4	0	0	5	0	5	57
Montana:											
Billings	0	------	0	0	2	0	0	0	0	0	7
Great Falls	0	------	0	3	0	0	0	0	0	1	6
Helena	0	------	0	0	1	0	0	0	0	0	5
Missoula	0	------	0	0	1	1	0	0	0	0	8
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Denver	2	------	0	3	4	0	0	4	0	5	77
Pueblo	0	------	0	0	0	2	0	0	1	2	8
New Mexico:											
Albuquerque	0	------	0	0	2	0	0	3	1	0	15
Utah:											
Salt Lake City	0	------	0	0	2	2	0	2	0	22	37
Washington:											
Seattle	0	------	0	11	0	3	0	2	0	2	79
Spokane	0	------	0	4	0	4	0	1	1	0	30
Tacoma	0	------	0	91	1	0	0	0	0	0	33
Oregon:											
Portland	0	1	1	3	4	7	0	4	0	5	91
Salem	0	------	------	18	------	0	0	------	0	0	------
California:											
Los Angeles	3	6	0	6	3	16	0	14	2	22	334
Sacramento	1	------	0	0	4	2	0	0	0	0	33
San Francisco	0	------	0	3	8	5	0	3	0	5	161

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
Vermont:			
Burlington	0	0	1
Massachusetts:			
Fall River	1	0	0
Worcester	0	0	3
Connecticut:			
Bridgeport	0	0	1
New York:			
Buffalo	0	0	23
New York	0	0	8
Rochester	0	0	1
New Jersey:			
Camden	0	0	1
Trenton	1	1	0
Pennsylvania:			
Philadelphia	0	0	15
Pittsburgh	0	0	6
Ohio:			
Cleveland	0	0	1
Columbus	0	0	2
Toledo	0	0	1
Illinois:			
Chicago	1	0	2
Michigan:			
Detroit	2	0	15
Wisconsin:			
Milwaukee	0	0	2
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	13
St. Paul	0	0	8
Iowa:			
Des Moines	0	0	7
Kansas:			
Wichita	1	0	0
Maryland:			
Baltimore	1	1	2
District of Columbia:			
Washington	1	0	1
Virginia:			
Norfolk	1	0	0
Georgia:			
Savannah	0	0	1
Kentucky:			
Covington	0	0	1
Louisiana:			
Shreveport	0	1	0
Texas:			
Dallas	0	0	1
Houston	1	0	2
Colorado:			
Denver	1	1	1
Pueblo	0	0	1
New Mexico:			
Albuquerque	0	0	1
Utah:			
Salt Lake City	0	0	2
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	1	6
Sacramento	0	0	1
San Francisco	0	0	3

Encephalitis, epidemic or lethargic.—Cases: Toledo, 1; Chicago, 1; Wichita, 4.

Pellagra.—Cases: Chicago, 1; Baltimore, 1; Charleston, S. C., 1; Florence, 2; Atlanta, 1; Savannah, 2; Miami, 2; Memphis, 1; Dallas, 1.

Typhus fever.—Cases: Charleston, S. C., 2; Atlanta, 4; Savannah, 2; Tampa, 1; Nashville, 11; Mobile, 1; Lake Charles, 1; Dallas, 1; Galveston, 1.

FOREIGN REPORTS

BRAZIL

Rio de Janeiro—Poliomyelitis.—A report dated October 16, 1939, states that for the week ended October 7, 1939, 9 new cases of poliomyelitis were reported in Rio de Janeiro, Brazil. During the month of September 1939, 2 deaths from this disease occurred.

SWEDEN

Notifiable diseases—August 1939.—During the month of August 1939, cases of certain notifiable diseases were reported in Sweden, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Poliomyelitis	46
Diphtheria	10	Scarlet fever	1,559
Dysentery	45	Syphilis	37
Epidemic encephalitis	1	Typhoid fever	19
Gonorrhea	1,335	Undulant fever	11
Paratyphoid fever	68	Weil's disease	4

VIRGIN ISLANDS

Notifiable diseases—July–September 1939.—During the months of July, August, and September 1939, cases of certain notifiable diseases were reported in the Virgin Islands, as follows:

Disease	July	August	September	Disease	July	August	September
Chickenpox		1		Pneumonia		2	
Filariasis	1	12	6	Schistosomiasis	2		
Gonorrhea	17	10	26	Syphilis	12	17	31
Hookworm disease	2	4	4	Tetanus	1		
Leprosy	2			Trachoma			2
Pellagra		1	1	Tuberculosis		6	4

YUGOSLAVIA

Communicable diseases—4 weeks ended September 10, 1939.—During the 4 weeks ended September 10, 1939, certain communicable diseases were reported in Yugoslavia, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	109	8	Poliomyelitis	18	2
Cerebrospinal meningitis	10	4	Scarlet fever	236	1
Diphtheria and croup	548	42	Sepsis	6	
Dysentery	412	35	Tetanus	49	18
Erysipelas	150	6	Typhoid fever	511	37
Favus	7		Typhus fever	7	
Paratyphoid fever	69		Weil's disease	2	1

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From the medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939 1	8	15	22	29	August 1939 5	12	19	26	September 1939 2	9	16	23	30
Afghanistan	C										[1] 214		[1] 122						
	D						82				99		45						
Kandahar Province	C												101						
Greshk	C					5													
Tchakhansour	C							P											
Ceylon: Batticaloa	C						1												2
China:																			
Canton	C			9															
	D			6															
Fatshan	C			P															
	D			154															
Hainan Island	C			P															
Hankow	C									P									
Honan	C			P															
Hong Kong	C			25	113	100	60	17	22	15	26	75	52	36	17	5	12	18	27
	D			19	80	62	[illegible]8	11	19	6	20	54	33	18		7			
Macao	C		1	20	59	95	103	59	81	65	20	17	17		11		17	21	
	D			12	33	68	58	32	30		9	7	6		9				
Shanghai	C				1				2			1	[2] 2		36	64	93	71	60
Tsinan	C																		3
Tsingtao	C																		P
Whampoa	C			P															
India	C	6,667	11,896	7,117	6,638	2,361	2,764												
	D	3,013	5,502	3,337	2,877	1,084	1,152												
Akyab	C			1	1		[2] 1												
Allahabad	C	[1] 1		1	[2] 1				7	17		12	15	12	10	2	6	2	
Assam	C	238	220	405	321	43	20		9	4	9		2		6				
	D	98	105	156	117	22	7		1	2	2		1						
Bassein	C	1	2	6	5														
Bengal Presidency	C	4,941	8,754	3,193	2,040	703	820	632	818	759	593	578	469		454				
	D	2,297	4,174	1,504	874	325	375	119	400	359	324	359	284						
Bihar Province	C			584	263														
	D			264	107														

Bombay Presidency	C	98	157	196	98	72	177	318	294	278									
	D	34	61	83	37	33	51	128	120	97									
Burma	C											10	26	7	16				
	D											10	24	7					
Calcutta	C	315	963	821	593	206	169	123	88	50	27	36	21	9	13	11	14	12	
Cawnpore	C	3	3	4	10	1	3		1		6	18	29	41	18	9	11	7	
	D	1		2	4	1	2		1		2	3	11	12					
Central Provinces and Berar	C	71	184	194	34		7	16	22	34	49	86	203	262		180			
Chittagong	C	2	12	9	3	[2] 2	3	1	2	5	1	2	2	2	1	1	1	5	
Delhi	C								1			2							1
	D		1									2							
Howrah	C	482	785	420	257	98	90	92											
Madras Presidency	C	201	84	60	66	19	53	28	32										
	D	93	30	24	13	7	26	9	12										
Madras	C	2			1														
Orissa Province	C	56	161	111	173	99	127	168	165	160	150	106	283	197		527			
Punjab	C										1								
Rangoon	C		4	9	4														
India (French):																			
Chandernagor Territory	C	16	22																
Pondichery Territory	C		1																
Indochina (French): Tonkin Province	C								1										
Iran:																			
Khorassan	C							79	246	46	30								
Zabol	C					10		22	2										
Iraq: Basra	C													[3] 1					
Thailand:																			
Bangkok	C		4	1															1
Smud Prakar Province	C	5	13																
On vessels:																			
S. S. *Erinpura* at Rangoon from Calcutta	C			1															
S. S. *Amra* at Calcutta from Rangoon	C				1														
S. S. *Tin How* at Singapore from Hong Kong	C						1												
S. S. *Esst* at Hong Kong from Calcutta	C							1											

[1] For 2 weeks.
[2] Imported.
[3] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939: 1	8	15	22	29	August 1939: 5	12	19	26	September 1939: 2	9	16	23	30
Algeria: Algiers	C	1																	
Argentina (see also table below)	C							1		1									
	D							1		1									
Belgian Congo	C	3		18					1		1				5	2	2	2	
Bolivia. (See table below.)																			
Brazil. (See table below.)																			
British East Africa:																			
Nyasaland	C								P	2									
Uganda	C	24	17	17	25	15	17	11	14	4	4	12	5						
	D	24	17	17	25	15	17	10	10	3	3	11	5						
China: Manchuria.[3]																			
Dutch East Indies:																			
Java—																			
Batavia	C												[3] 1						
Batavia Residency.[4]																			
Java and Madura	C	236	167	94	37														
	D	232	165	94	37														
Ecuador (see also table below):																			
Chimborazo Province	C	6	[5] 18																
Guayaquil	C	1	2																
	D		2																
Plague-infected rats		3																	
Egypt: Asyut Province	C	22	35	10	2														
Hawaii Territory: Plague-infected rats:																			
Hawaii Island—Hamakua District:																			
Hamakua Mill Sector				1				1								2			
Honokaa			1																
Kapulena			2		1														
Kukaiau		3																	
Paauhau Sector		5				1		2							1		1		
Paauilo					1														
India	C	5,718	10,527	770	72	2	27												
	D	2,636	3,118	524	35	3	15												
Bassein	C	3			1		2				1					2			
Plague-infected rats		1												2			2		
Bihar Province	C			12															
	D			9															

Bombay Presidency	C	33	46	11	6		5	3	5	11									
	D	20	23	8	2	1			2	8									
Burma	C								30	14		4	15	21	32				
	D								23	13		9	14	19					
Calcutta	C		1																
Calicut	C			1															2
Central Provinces and Berar	C	2,056	1,914	198	6	3				4	10	31	31	65		76			
Coorg Province	C		4	1	1	2													
Madras Presidency	C	28	15	14	14		2	2	1										
	D	19	8	8	6		2												
Rangoon	C				1									1					
	D				1									1					
Indochina:																			
Cambodia	C				1														
Pnom Penh	C		1																
Madagascar. (See table below.)																			
Peru. (See table below.)																			
Thailand:																			
Bichitr Province	C			4															
	D			1															
Bisnulok Province	C	1																	
Prae	C		3																
Svargalok Province	C	2																	
Tunisia: Tunis	C		1																
Union of South Africa	C	22	9											6					
Cape Province	C	4	4	1															
Orange Free State	C	6	7																
Transvaal	C	7																	
United States.[6]																			

[1] Including plague in the United States and its possessions.

[2] Information dated May 5, 1939, states that 34 cases of plague with 8 deaths had occurred in Hsinking, Manchuria, since the beginning of the year. Report dated Aug. 26, 1939, states that up to the beginning of August, 12 deaths from plague occurred in Kailu, in the eastern part of Hsingan West Province, and that up to Aug. 15, 1939, 51 deaths from plague occurred in Kirin Province, Manchuria.

[3] Imported.

[4] A report dated July 10, 1939, states that up to July 6, 1939, 84 deaths from pneumonic plague occurred in Batavia Residency, Java, Dutch East Indies.

[5] Includes 11 cases of pneumonic plague.

[6] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1939 *California*—Ground squirrels, March and April; insects, March and June; *Idaho*—Insects, June 14; *Montana*—Ground squirrels, July 15; insects, July 15 and 17; *Nevada*—Insects, April; *New Mexico*—Kangaroo rat, Apr. 15; *Oregon*—Ground squirrels, June; insects, May and June; *Washington*—Rabbit, May; insects, April and May; *Wyoming*—Insects, July 3.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths, P, present]

Place		March 1939	April 1939	May 1939	June 1939	July 1939	August 1939
Argentina (see also table above).							
Mendoza Province	C					1	
San Luis Province	C					1	
Bolivia	C	[7] 1					
Brazil:							
Alagoas State	C	11	1				
Bahia State	C	1					
Pernambuco State	C	5	6				
Sao Paulo State	C		1				
Ecuador (see also table above): Guayaquil and vicinity—Plague infected rats						41	
Madagascar (central region)	C	52	33	16	12	21	
	D	21	25	14	12	19	
Peru	C	12	11	11	3	7	2
Cajamarca Department	C	3					
Lambayeque Department	C	1	1	1			
Libertad Department	C	1	2	3	1		2
Lima Department	C	2	1		1	7	
Piura Department	C	5	7	7	1		

[7] Pneumonic plague.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939: 1	July 8	July 15	July 22	July 29	August 1939: 5	Aug. 12	Aug. 19	Aug. 26	September 1939: 2	Sept. 9	Sept. 16	Sept. 23	Sept. 30
Algeria: Oran Department	C		1	2	1					2									
Belgian Congo. (See table below.)																			
Bolivia. (See table below.)																			
Brazil: Porto Alegre	C			7	6														
British East Africa:																			
Nairobi	C				26														
Nyasaland	C						1				1								
Tanganyika	C	96	146	9	48	1	13	4		1	4	27							
Canada:																			
Alberta	C	7			22														
British Columbia	C	8																	
Manitoba	C	22	13	2	1				1										
Saskatchewan	C	2			1	1													
Canary Islands: Las Palmas	C	3																	
Ceylon: Maskeliya	C	1																	
China (see also table below):																			
Dairen	C	2	4	5	2	2													

Foochow	C	2	8	12	8														
Hong Kong	C	45	34	11	1	1				1									
	D	49	26	11	1	1													
Shanghai	C	102	50	18	8	2	1					1							
Swatow	C	2	7																
Tientsin	C		4	1	1														
Chosen (Korea). (See table below.)																			
Colombia (see also table below): **Cartagena**	D	2	1						1										
Dahomey. (See table below.)																			
Dominican Republic	C										1								
Ecuador: **Guayaquil**	C	4	1		3	1													
	D	1	1		1														
Eritrea: Massaua	C				1			1											
French Equatorial Africa:																			
Brazzaville	C											31							
Chad	C		14																
French Guinea	C						40												
Gold Coast	C					9													
Accra	C					1													
Greece. (See table below.)																			
Guatemala. (See table below.)																			
India	C	15, 237	18, 580	17, 603	11, 499	2, 110	1, 940												
	D	3, 254	4, 895	4, 051	3, 009	502	533												
Allahabad	C	2		1		1													
Assam	C	121	225	252	127	20	7	19	11	15	12	22	19		15				
Bengal Presidency	C	2, 152	3, 305	1, 626	781	164	148	119	130	108	49	77	48		93				
	D	724	1, 242	605	295	52	60	37	50	41	21	28	18						
Bihar Province	C			2, 360	672														
Bombay Presidency	C	3, 936	6, 398	4, 061	2, 809	527	313	443	336	305									
	D	558	961	598	415	115	65	92	84	67									
Bombay	C	56	61	41	40	15	16	5	4	10	9	8	6	5	3		2	1	
	D	21	20	17	21	9	8	5	4	6	8	4	3	2					
Burma	C					1	1		2	4		6	3	9	7				
	D								1	2		5		3					
Calcutta	C	806	910	298	127	33	32	26	12	9	12	3	5	2		1	3		
	D	548	676	285	95	19	20	23	7	8	10	1	5	1					
Cawnpore	C	5	14	16	3														
Central Provinces and Berar	C	540	1, 132	904	757	119	116	62	38	32		52	47	27		3			
Cochin	C		3		1														
Delhi	C	133	187	203	99	10	7	5	7	5	7	2	3	2	1		1	3	
Howrah	C	152	222	103	87	17	30	13											
Jodhpur	D			38	7		4	1	6	3			2			1	1		
Karachi	C	3	3	8	1			1	1	4	2	1	3	1	1	3		1	
Madras Presidency	C	1, 400	1. 020	545	465	114	125	175	127										
	D	234	241	155	102	24	25	35	26										
Madras	C	236	193	32	12	3	1	4	3	2	1	4	5	1	1	3	2		
Negapatam	C										1					1			
Northwest Frontier Province	C	114	110	86	165	22	15	30	19	9	7	3	1	10		7			
Orissa Province	C	699	1, 039	722	376	60	111	75	95	50	52	68	231	159		167			
Punjab	C	180	191	214	214	48	24	8											
Rangoon	C	14	10	14	10	1			1	2	2	5		9	7	3		2	
Sind State	C	279	251	209	131	53	21	59	20	20	13	16	51	4		3			
Vizagapatam	C		6																

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939: 1	8	15	22	29	August 1939: 5	12	19	26	September 1939: 2	9	16	23	30
India (French):																			
Chandernagor Territory	C		4	3			1		1										
Pondichery Territory	C	7	3				6		2										
	D	3	2				1		2										
Indochina (French) (see also table below):																			
Tonkin Province	C	211	223	135	54	1		1	1										
Hanoi	C	6	13	22	3														
Iran	C	11	10	3	3														
Teheran	D									6									
Iraq	C		6		6														
Baghdad	C			[1] 1															
Ivory Coast. (See table below.)																			
Japan:																			
Kobe	C	16																	
Nagoya	C	1								1									
Osaka	C	1	1	5	1														
Taiwan.[2]																			
Tokyo	C		1																
Mexico (see also table below):																			
Mexico, D. F.	C	6	3	3	5	1		2			1								
Monterrey	C	1	1									1							
Piedras Negras	D	1																	
San Luis Potosi	D	3	1	1	4		1												1
Tampico	C	22	1										1						
Morocco. (See table below.)																			
Mozambique	C	11	11	32	1	1													
Nigeria	C	884	1,231	514	76	25	21	34	16	20		53	8						
Calabar	C	5	3	44			1						1						
Lagos	C	1		4								1							
Port Harcourt	C	1			[1] 1														
Niger Territory. (See table below.)																			
Portugal (see also table below):																			
Lisbon	C	21	31	33	53	6	7	10	3	6	3	15	11	10	12	8	14		
Oporto	C	2	2	8	10	4			5	3			1			1			
Portuguese Guinea. (See table below.)																			
Salvador. (See table below.)																			
Senegal. (See table below.)																			

Sierra Leone	C	2	8	20															
Society Islands: Tahiti	C						[3] 12												
Southern Rhodesia	C		21	11	3														
Spain (see also table below):																			
Barcelona	C						[1] 1	4											
Malaga	D					2		2	1					1					
Valencia	C				1						4	3	3	2	1				
Straits Settlements: Singapore	C	1																	
Sudan (Anglo-Egyptian)	C	17	90	12	15	1		1	21		5	74	11	16	9	5			4
Syria: Aleppo	C	1																	
Thailand	C	2	2		1	2	1												
Bangkok	C							1											
Nan Province	C								24										
Turkey. (See table below.)																			
Union of South Africa. (See table below.)																			
Uruguay	C	1																	
Venezuela. (See table below.)																			

[1] Imported.
[2] Information dated Apr. 6, 1939, states that up to Mar. 31, 61 cases of smallpox were reported in Taiwan, Japan.
[3] Suspected.

On vessels:		
Pilgrim ship *Tantalus* at Penang from Jeddah	1 case	Feb 27, 1939
Pilgrim ship *Ajar* at Penang from Jeddah	1 case	Mar. 2, 1939
S. S. *Gneisenan* at Genoa	1 case	Mar. 5, 1939
S. S. *Riley* at Freemantle from Shanghai	1 case	Do.
S. S. *Mau Sang* at Sandakan from Hong Kong	1 case	Apr. 6, 1939
S. S. *Thistleglen* at Singapore	1 case	Apr. 10, 1939
On vessels—Continued.		
S. S. *Empress of Russia* at Hong Kong from Shanghai	2 cases	Apr. 20, 1939
S. S. *Liebenfels* at Rangoon from Moulmein	1 case	June 2, 1939
S. S. *City of Pittsburgh*, Manila, P. I.	1 case	June 28, 1939
S. S. *Atalaya* at New Orleans	1 case	July 25, 1939
S. S. *Saturnia* at Jamaica, N. Y., from Lisbon	1 case	Aug. 3, 1939
S. S. *Erispura* at Rangoon from Madras	1 case	Aug. 7, 1939

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		March 1939	April 1939	May 1939	June 1939	July 1939	August 1939
Belgian Congo	C			169	199		
Bolivia:							
Cochabamba Department	C	8	1		9	6	
La Paz Department	C	8	4	4	1		
Oruro Department	C	1	2		4	14	
Potosi Department	C	1					
Santa Cruz Department	C	6		2		1	
China: Harbin	C	5	5	1	1		
Chosen (Korea)	C	42					
Colombia (see also table above)	C	[4] 548	494	437	375	137	
Dahomey	C	4				8	
Ecuador: **Guayaquil** and vicinity	C				5		
Greece	C	38	7	11			
Guatemala	C		4				
Indochina (French) (see also table above)	C	515	606	671	178	103	
	D	79	52	109	31	21	
Ivory Coast	C	17					
Mexico (see also table above):							
Aguascalientes State	D				[5] 3		[6] 5
Aguascalientes	C	3					
Chiapas State	D						[6] 1
Chihuahua State	D				[5] 5		[6] 1
Coahuila State	D				[5] 2		
Durango State	D						[6] 4
Guanajuato State	D				[5] 246		[6] 270
Guerrero State	D				[5] 3		[6] 3
Hidalgo State	C	7					
	D	1			[5] 13		[6] 9
Jalisco State	D				[5] 4		[6] 3
Mexico, D. F.	C	9					
	D		3		5		1
Mexico State	D				[5] 146		[6] 41

Place		March 1939	April 1939	May 1939	June 1939	July 1939	August 1939
Mexico—Continued.							
Michoacan State	D				[5] 137		[6] 79
Morelos State	D				[5] 9		[6] 1
Nayarit State	D				[5] 2		
Nuevo Leon State	D				[5] 1		[6] 2
Monterrey	C	3					
Oaxaca State	D				[5] 1		[6] 1
Puebla State	D				[5] 20		[6] 32
Queretaro State	D				[5] 34		[6] 31
San Luis Potosi State	D				[5] 22		[6] 19
San Luis Potosi	C	11			8		
	D	3			5		
Sinaloa State	D				[5] 7		[6] 1
Sonora State. **Guaymas**	C	1					
Tamaulipas State: **Tampico**	C	15					
	D	2					
Tlaxcala State	D						[6] 2
Vera Cruz State	D						[6] 1
Zacatecas State	D				[5] 27		[6] 16
Morocco	C	1		6			
Niger Territory	C	40	9		3		
Portugal (see also table above)	C	112	108				
	D	11	9				
Portuguese Guinea	C		115		7		
	D		8				
Salvador	C	1					
Senegal	C	66	42	55	25	24	2
Spain (see also table above)	C			49		31	
Turkey	C		59	34			
Union of South Africa: Transvaal	C				81		
Venezuela	D	6	3	7	6	2	
Caracas	C					1	22

[4] For February and March.
[5] For May and June.
[6] For July and August.

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939				July 1939					August 1939				September 1939			
					3	10	17	24	1	8	15	22	29	5	12	19	26	2	9	16	23
Algeria:																					
Algiers Department	C	29	21	26	12	28	25	9	18			21	6	7	4	12	7	6	35		
Algiers	C	16	5	22	7		7		2			4									
Constantine Department	C	164	195	188	43	43	56	56	33			78	13	11	10	2	3	3	3		
Bone	C	2	9	1								1									
Constantine	C	7	39	52	3		31		6			51	6	6							
Philippeville	C	14	2	9	4		1	1				1									
Oran Department	C	29	31	28	7	5	21	6	7			1	2	4	5						
Southern Territories	C	21	13	62	17		4														
Australia:																					
Brisbane	C	1						1	1												
Queensland	C		5	1							4										
Bolivia. (See table below.)																					
British East Africa: Kenya	C		1																		
Bulgaria. (See table below.)																					
Chile	C	43	28	49	23	36	56	75	106	115	114	3	8								
Antofagasta Province	C		2	5	2	1		2	6			1									
Bio Bio Province	C	5	2																		
Cautin Province	C	1																			
Coquimbo Province	C	2																			
Curico Province	C			1					1												
Nuble Province	C	4	7								2	1									
Santiago Province	C	25	14	39	15	33	54		92	113	104	1	1								
Valdivia Province	C		1	1	4			1													
Valparaiso	C		1	1						1		1	3	1		1				3	
China (see also table below):																					
Dairen	C			2								2		3	2						
Hankow	C			1			1														
Shanghai	C			2				12	7	14	8	10	10	9							
Tientsin	C		3	1																	
Chosen (Korea). (See table below.)																					
Egypt:																					
Alexandria	C	3	13	26	9	3				1	2		1		1		1				
Asyut Province	C		14	15	3		2				1			1				1			
Beheira Province	C	44	109	64	7	6	3	5	8	7	15	1	2	9	2	3	3				
Beni Suef	C			1									1	1			1				
Cairo	C	31	37	9	2			3				1					2				
Dakahliya Province	C	106	178	196	54	37	31	19	31	23	11	10	2	4	8	3					
Fayum Province	C		7																		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended—																	
					June 1939				July 1939					August 1939				September 1939			
					3	10	17	24	1	8	15	22	29	5	12	19	26	2	9	16	23
Egypt—Continued.																					
Gharbiya Province	C	245	355	216	45	39	15	13	18	26	48	30	8	4	3	6	4	4			
Girga Province	C	47	42	31	18	7		1	3	1	1	1	1	2		2		2			
Giza Province	C	16	53	22	8	11	6	3													
Kalyubiya Province	C	84	44	45	16	5	3	2						4	1						
Minufiya Province	C	101	96	141	21	12	20	12	12	27	11	5	3	6	3	5	2				
Port Said	C														3						
Qena Province	C	47	127	21	2	4								1							
Sharkiya Province	C	46	66	24	11	5	4	4	3	2	1	3	1	2							
Suez	C																	1	1		
Provinces	C	748	1,110	828	186	126	90	59	75	92	92	53	18	38	21	18	10	8		6	2
Eritrea: Hamasien	C	4					5														
Guatemala. (See table below.)																					
Hawaii Territory: Honolulu	C	1		1			1					1	2		1		1			2	4
Hungary	C	5	9							1											3
India: Coorg Province	C	5	3			3															
Iran	C		1	18	3		2	8													
Tabriz	C	1			6	4					4			1	1	10					
Iraq	C								2	1		1	1								
Arbil Province	C			1	2		1	1						4							
Baghdad	C	1	3	2				1	2	1		1	1	1			2	4		1	
Kirkuk Province	C			7																	
Irish Free State: Louth County—Drogheda	C								5												
Latvia. (See table below.)																					
Lithuania. (See table below.)																					
Mexico (see also table below):																					
Guadalajara	D																		1		
Mexico, D. F.	C	2	5	13	7	7	7		4	9	7	6									
Monterrey	C			1				3			3		2			1			1	1	
Saltillo	C					1															
San Luis Potosi	D		1	1																	
Torreon	D		2	1								4									
Morocco	C	177	193	145	28	30	29		10	5	6			3							
Casablanca	C		12		1				1												
Nigeria: Kano Province	C												[1] 1								

Palestine:																					
Haifa	C		2	4			3		1		1		1			1	2		4	3	1
Jaffa	C	1	1	2			3		5		1		1	1			5	4		6	4
Panama Canal Zone. (See table below.)																					
Peru. (See table below.)																					
Poland	C	580	786	437	97	81	71	78	60	46	23	23	16	24	18						
	D	23	34	12	3	6	2	2	2	2	1	1		1	1						
Portugal: Oporto	C		3																		
Portuguese East Africa: Laurenco Marques	C	2																			
Rumania. (See table below.)																					
Spain. (See table below)																					
Straits Settlements: Singapore	C	1	1																		
Syria:																					
Beirut	C	1																			
Lebanese Republic	C		2																		
Trans-Jordan	C		8	9		1			1												
Tunisia:																					
Tunis	C	64	89	39	1	13	2	2	5	9	1	14	1	1	2	3	1				
Provinces	C	694	1,073	1,006	202	228	316	221	333	202	181	158	124	109	52	44	29				
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Venezuela. (See table below.)																					
Yugoslavia	C	49	115	62	10	3	17	5		5	17	2	2	1							
On vessels:																					
S. S. *Stanbrook* at Mers el Kebir	C		1																		
S. S. *Normandie* at Plymouth	C								1												

[1] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		March 1939	April 1939	May 1939	June 1939	July 1939	August 1939
Bolivia:							
Cochabamba Department	C	1					
De Beni Department	C					2	
La Paz Department	C		10	11	7	4	
Oruro Department	C		1	1		3	
Potosi Department	C	7	11	2	4	2	
Santa Cruz Department	C			2		1	
Tarija Department	C	1					
Bulgaria	C		14		8		
China: Manchuria—Harbin	C	23	4	16	14		
Chosen (Korea)	C	106		290	156		
Guatemala	C	25	14	4	8	9	21
Latvia	C		1				
Lithuania	C	32	23	6			
Mexico (see also table above):							
Aguascalientes State	D				[2] 4		[3] 4
Aguascalientes	C	2					
	D	1					
Chihuahua State	D				[2] 1		
Coahuila State	D				[2] 2		[3] 5
Durango State	D				[2] 2		[3] 4
Guanajuato State	D				[2] 7		[3] 12
Guerrero State	D				[2] 2		
Hidalgo State	C	1					
	D				[2] 15		[3] 19
Jalisco State	D				[2] 3		[3] 7
Mexico, D. F.	C	9			27		
	D	3	3		11		[3] 9
Mexico—Continued.							
Mexico State	D				21		[3] 17
Michoacan State	D				[2] 10		[3] 5
Nuevo Leon State	D						[3] 1
Oaxaca State	D				[2] 22		[3] 16
Puebla State	D				[2] 24		[3] 24
Queretaro State	D				[2] 4		[3] 1
San Luis Potosi State	D				[2] 2		[3] 2
San Luis Potosi	C	3					
Sonora State	D				[2] 2		[3] 1
Tabasco State	D				[2] 1		
Tlaxcala State	D				[2] 2		[3] 3
Vera Cruz State	D				[2] 3		[3] 3
Yucatan State	D						[3] 1
Zacatecas State	D				[2] 17		[3] 14
Panama Canal Zone	C			1	1		
Peru	C	197					
Rumania	C	205	28	40	75	13	
Spain	C		4	14	9	7	
Turkey	C	57	62	49	35	15	
Istanbul	C	4	4		3		
Union of South Africa:							
Cape Province	C	17	32	127			
Natal	C	2	35	7	7		
Orange Free State	C	3	4	4	4		
Transvaal	C	16	16	13	13		
Venezuela Bolivar	C		1	3			3

[2] For May and June.
[3] For July and August.

YELLOW FEVER

[C indicates cases; D, deaths, P, present]

Place		Feb. 26–Mar. 25, 1939	Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	Week ended— June 1939: 3	10	17	24	July 1939: 1	8	15	22	29	August 1939: 5	12	19	26	September 1939: 2	9	16
Brazil:[1]																				
Amazonas State	D										[2] 1									
Bahia State	D												[2] 1							
Espirito Santo State	D	21	28	[2] 1																
Minas Geraes State	D	3	2																	
Para State	D			[2] 1						1	1									
Rio de Janeiro State	D	1																		
Cameroon: Bafia	C													[3] 1						
Colombia: Antioquia Department:																				
Caracoli	D				1							1								
San Carlos	D								1			1						1		1
Dahomey: Bohicon.[4]																				
French Equatorial Africa:																				
Bangui	C																			[5] 1
Gabon	D										1									
French Guinea	C					2														
Gold Coast	C		1		1															
Ivory Coast[6]	C		3	[7] 5	1	[8] 8														
Nigeria	C	1										1					[5] 1			
Niger Territory:																				
Konni Circle	C							3												
Tahua	C			[5] 1																
Senegal:																				
Bambey	C							1												
Diourbel	C							6												
Ziguinchor	C							10												
	D							5												
Sudan (French): Bandiagara	C							1												

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type.
[3] Exact date not given.
[4] During the week ended Oct. 7, 1939, 1 suspected case of yellow fever was reported in Bohicon, Dahomey.
[5] Suspected.
[6] During the week ended Oct. 14, 1939, 1 case of yellow fever was reported in Seguela, Ivory Coast.
[7] Includes 1 suspected case.
[8] Includes 4 suspected cases.

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

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Public Health Reports

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DISABLING MORBIDITY, AND MORTALITY AMONG WHITE AND NEGRO MALE EMPLOYEES IN THE SLAUGHTER AND MEAT PACKING INDUSTRY, 1930-34, INCLUSIVE [1]

By HUGH P. BRINTON, *Associate Statistician, United States Public Health Service*

There is a notable paucity of published material on the incidence of disabling sickness and nonindustrial injuries among comparable Negro and white populations (*8–10*). The occupational morbidity and mortality study offered an opportunity for the analysis of sick benefit organization records which included data on disability arising from 625,666 months of membership for white male and 101,717 months of membership for Negro male employees in the slaughter and meat packing industry covering the 5 years from January 1, 1930 through December 31, 1934. During this time there were recorded 4,951 and 1,169 cases of disability among white and Negro males, respectively.

The present report, in brief, is devoted to a comparison of the magnitude of disability rates for Negro males with the corresponding rates for white males. Moreover, for certain broad diagnosis groups and particular occupational and socio-economic classes, the variation in the ratio of Negro to white disability rates will be examined.

With regard to the possible distorting influence of the rules and regulations of the sick benefit organizations on the disability data, it is believed that the effect in the present instance is minimized, since over 95 percent of the total membership was enrolled in one organization and interest centers primarily on the *ratio* of Negro to white rates.

Since the meat packing plants were located in Middle Western cities, the data may be considered to reflect the relative morbidity experience of the urban, northern Negro in this particular industry. No deductions can be safely drawn with respect to other industries or other sections of the country. Only disabilities that began during the study period and lasted 8 calendar days or longer were counted as cases, with the result that the possible disturbing effect of minor illnesses is eliminated.

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[1] From the Division of Industrial Hygiene, National Institute of Health, Washington, D. C. The supporting data of this report are drawn from material collected by the occupational morbidity and mortality study of the National Health Survey, a survey made possible by a grant from the Works Progress Administration in 1935.

Acknowledgment is made to Dr. W. M. Gafafer for suggestions and criticism.

ANALYSIS OF THE DATA

Disability rates by age.—Table 1 presents disability rates for white and Negro males of different broad age groups, the diagnoses giving rise to the rates being combined into four broad groups. The annual number of cases (all diagnoses) per 1,000 persons, or the frequency rate, is 45 percent greater for Negro than for white males. Figure 1

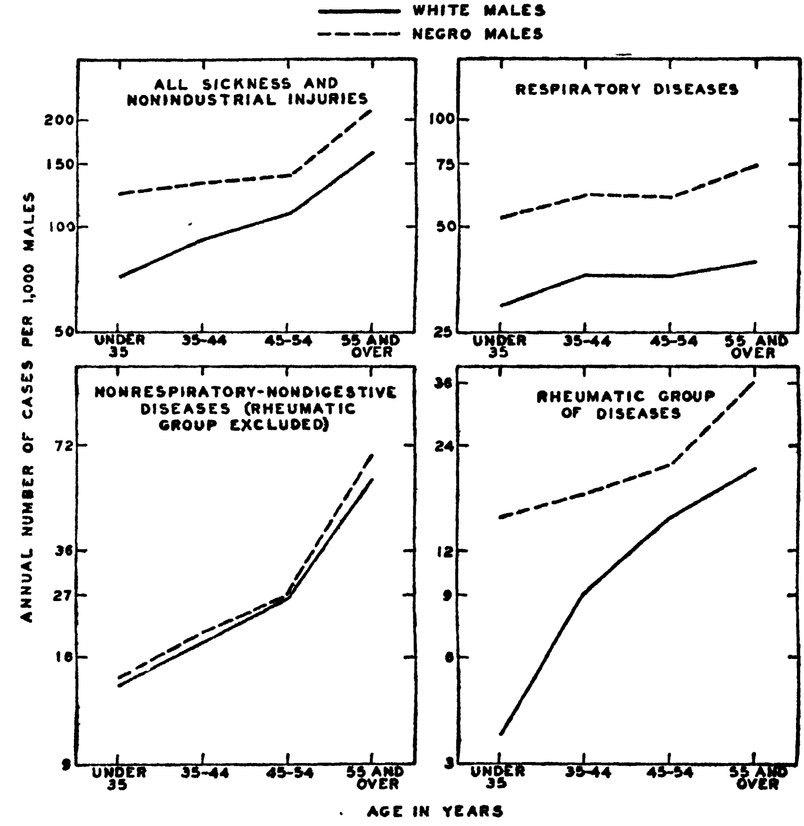

FIGURE 1.—Annual number of cases per 1,000 white males and Negro males, respectively, of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer by broad age groups, according to diagnosis, employees in the slaughter and meat packing industry, 1930–34, inclusive.

shows that the difference is more marked for males under 35 years of age than for the older age groups. From the youngest age group through 35–44 years, the rate for white males increased more rapidly than the rate for Negroes, while from 45–54 to 55 and over the rate of increase was almost the same for both races.

The frequency rates for different diagnosis groups vary greatly both as to the Negro to white ratio and as to changes with age. It will be seen from figure 1 that respiratory diseases increase but little

TABLE 1.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, annual number of days of disability per male and average number of days per case, by age and broad diagnosis group, white male and Negro male employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis group	All ages[1]			Age in years as of July 1, 1932: Under 35			35–44			45–54			55 and over		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
ANNUAL NUMBER OF CASES PER 1,000 MALES															
Total, all diagnoses[2]	95.0	137.9	1.45	72.1	124.2	1.72	91.7	133.5	1.46	107.3	139.4	1.30	159.8	214.4	1.34
Nonindustrial injuries	13.5	18.6	1.38	12.2	23.7	1.94	12.8	17.4	1.36	12.8	17.2	1.34	22.0	5.8	.26
Respiratory diseases	34.3	59.6	1.74	29.6	53.6	1.81	36.3	61.6	1.70	36.2	60.5	1.67	39.7	74.4	1.87
Digestive diseases	13.0	14.1	1.08	10.7	13.1	1.22	12.7	15.3	1.20	15.0	11.1	.74	17.5	21.9	1.25
Nonrespiratory-nondigestive diseases	32.9	43.1	1.31	18.6	30.9	1.66	28.8	38.5	1.34	41.3	47.8	1.16	78.5	105.0	1.34
ANNUAL NUMBER OF DAYS OF DISABILITY PER MALE															
Total, all diagnoses[2]	3.16	4.01	1.27	1.99	3.12	1.57	2.79	3.59	1.29	3.84	4.68	1.22	7.08	8.06	1.14
Nonindustrial injuries	.38	.46	1.21	.30	.48	1.60	.35	.47	1.34	.40	.52	1.30	.69	.18	.26
Respiratory diseases	.88	1.50	1.70	.67	1.31	1.96	.91	1.40	1.54	.98	1.60	1.63	1.38	2.54	1.84
Digestive diseases	.53	.40	.75	.40	.30	.75	.51	.42	.82	.66	.48	.73	.77	.59	.77
Nonrespiratory-nondigestive diseases	1.34	1.61	1.20	.60	.98	1.63	1.00	1.29	1.29	1.76	2.04	1.16	4.18	4.60	1.10
AVERAGE NUMBER OF DAYS PER CASE															
Total, all diagnoses[2]	33.3	29.1	0.87	27.6	25.2	0.91	30.5	26.9	0.88	35.8	33.6	0.94	44.3	37.6	0.85
Nonindustrial injuries	28.0	24.6	.88	24.7	20.3	.82	27.6	27.0	.98	31.0	30.0	.97	31.6	30.0	.95
Respiratory diseases	25.9	25.2	.97	22.6	24.4	1.08	25.0	22.7	.91	27.1	26.5	.98	34.7	34.2	.99
Digestive diseases	40.7	28.6	.70	37.5	23.0	.61	39.8	27.5	.69	43.8	43.2	.99	44.2	27.0	.61
Nonrespiratory-nondigestive diseases	40.8	37.3	.91	32.2	31.8	.99	34.8	33.5	.96	42.7	42.7	1.00	53.2	43.8	.82
Number of person-years of membership	52,138.8	8,476.4		18,013.1	3,043.6		17,693.2	2,937.2		11,168.8	1,800.1		5,142.5	685.5	

[1] Includes some persons of unknown age.

[2] Includes some cases of ill-defined or unknown diagnosis.

with age and that the large excess in the rate for Negroes remains relatively the same throughout all age groups. Nonrespiratory-nondigestive diseases, with rheumatic diseases excluded, increase sharply at 45 years and over. There is very slight difference between the races for any age group; the rates for the Negroes are, however, consistently higher than those for the whites. The rates for digestive

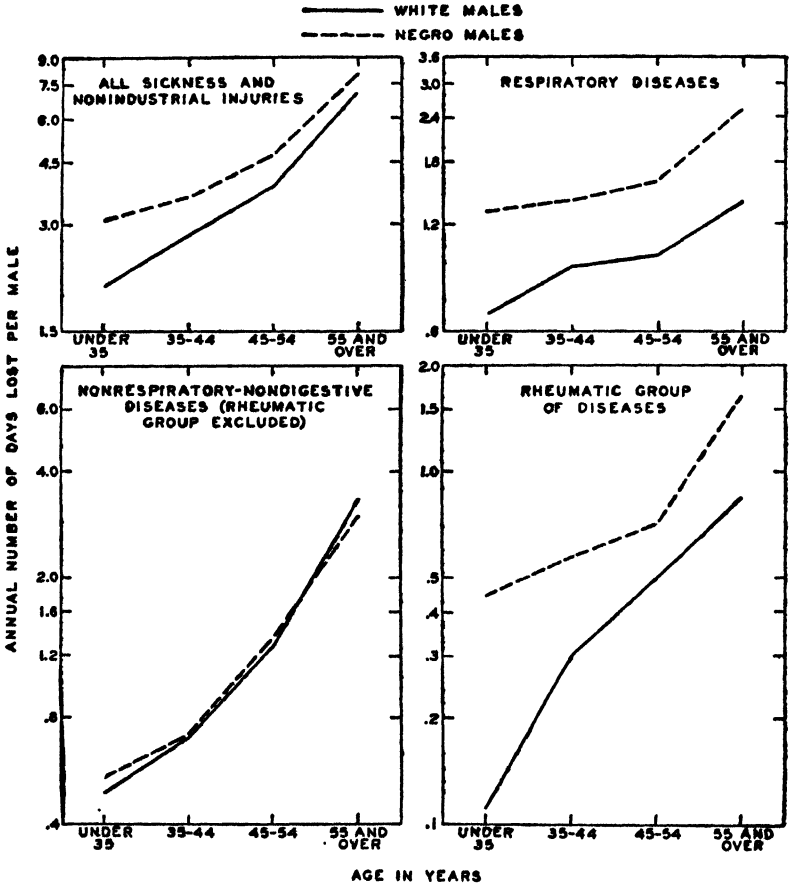

FIGURE 2.—Annual number of days of disability per white male and Negro male, respectively, from sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer by broad age groups, according to diagnosis, employees in the slaughter and meat packing industry, 1930–34, inclusive.

diseases (not shown in the figure) are approximately 22 percent higher among Negroes except for the age group 45–54 years, when the white rate is in excess by 35 percent. Nonindustrial injuries (not shown in the figure) follow opposite trends for the two races, rising gradually with age for white males, and decreasing sharply with age for Negro males. On the whole, the most unfavorable frequency rates for Negroes are for respiratory and rheumatic diseases, while the other

diagnosis groups fail to show a marked or consistent difference for all age groups.

The annual number of days of disability per person for all sickness and nonindustrial injuries and for selected diagnosis groups, as shown in figure 2, follows a pattern remarkably similar to that for the frequency rate. The most noticeable effect of dividing person-years into days of disability instead of into the number of cases is to make the resulting rate rise somewhat more sharply in the older age groups.

In nearly every instance the ratio of Negro to white rate for days per person is equal to or less than the corresponding ratio for the frequency rate. Because of slightly shorter duration per case for Negro males, a rate based on annual number of days of disability per person will show less variation by race than a rate based on frequency. With respect to digestive diseases, for each age group Negroes have fewer days of disability per person than whites.

The Negro rate was favorable with respect to the average number of days per case for all ages and all diagnosis groups except nonrespiratory-nondigestive diseases for persons aged 45-54 years, where the rates for the two races were the same, and respiratory diseases among persons under 35 years, where the average case among Negroes was 8 percent longer. For all ages there was least difference between the length of Negro and white cases for respiratory diseases and most difference for digestive diseases. The latter were very much shorter for Negroes.

The rates for the rheumatic group of diseases, which includes acute and chronic rheumatism, lumbago, neuralgia, neuritis, and sciatica, are shown in the following table:

Age group in years	Annual number of cases per 1,000 males			Annual number of days of disability per male			Average number of days per case		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
All ages [1]	9.6	18.9	1.97	0.33	0.64	1.94	34.4	33.7	0.98
Under 35 years	3.6	15.1	4.19	.11	.44	4.00	32.0	28.8	.90
35-44	9.1	17.4	1.91	.30	.57	1.90	32.6	32.7	1.00
45-54	14.9	21.1	1.42	.49	.71	1.45	32.9	33.8	1.03
55 and over	20.6	36.5	1.77	.85	1.63	1.92	41.0	44.7	1.09

[1] Includes some of unknown age.

It is apparent that, for the rheumatic diseases, the Negro experience, both in terms of cases per 1,000 and days of disability per male, is very unfavorable, especially in the youngest and oldest age groups. Considering both series of rates, the excess for Negroes does not fall below 42 percent and reaches a maximum of 319 percent. For males 35 years of age and over the cases among Negroes lasted on the average

longer than those among white persons, which indicates that greater frequency was associated with greater severity.

Frequency of disabilities by detailed diagnosis.—Table 2 shows for two age groups the frequency of certain diagnoses for white and for Negro males. It will be observed that for most diagnoses the rate for Negroes is higher. The white rate, however, is higher for both age groups for ulcer of the stomach or duodenum, appendicitis, hernia, and diseases of the skin. In the younger age group the white rate is higher for diseases of the pharynx and tonsils, and diseases of the nervous system.

TABLE 2.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, by age, under 35 years and 35 years and over, according to diagnosis, white male and Negro male employees in the slaughter and meat packing industry, 1930–1934, inclusive*

Diagnosis	Annual number of cases per 1,000 males					
	Under 35 years of age			35 years of age and over		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
Total, all diagnoses	72.1	124.2	1.72	107.1	145.7	1.36
Nonindustrial injuries	12.2	23.7	1.94	14.2	15.9	1.12
Sickness	59.9	100.5	1.68	92.9	129.8	1.40
Respiratory diseases	29.6	53.6	1.81	36.8	62.9	1.71
Diseases of the pharynx and tonsils	7.4	6.9	.93	3.8	5.5	1.45
Bronchitis, acute and chronic	2.2	5.6	2.55	3.4	7.0	2.06
Other diseases of the upper respiratory tract	3.5	3.6	1.03	4.9	5.7	1.16
Influenza, grippe	13.5	26.0	1.93	19.5	35.0	1.79
Pneumonia, all forms	1.0	2.6	2.60	2.0	4.1	2.05
Pleurisy	.9	4.9	5.44	1.4	3.5	2.50
Respiratory tuberculosis	.6	3.0	5.00	1.5	1.9	1.27
Other respiratory diseases	.5	1.0	2.00	.3	.2	.67
Digestive diseases	10.7	13.1	1.22	14.2	14.7	1.04
Diseases of the teeth and gums	.4	1.0	2.50	.8	1.3	1.62
Ulcer of the stomach or duodenum	.9	.3	.33	1.2	1.1	.92
Other diseases of the stomach	.7	3.6	5.14	1.8	2.2	1.22
Diarrhea, enteritis	.7	3.6	5.14	2.1	4.0	1.90
Appendicitis	5.9	2.6	.44	3.4	1.5	.44
Hernia	1.1	.3	.27	2.2	1.7	.77
Other digestive diseases	1.0	1.7	1.70	2.7	2.9	1.07
Nonrespiratory-nondigestive diseases	18.6	30.9	1.66	40.4	50.0	1.24
Diseases of the circulatory system	2.1	2.6	1.24	8.2	9.4	1.15
Genitourinary diseases	1.4	2.3	1.64	3.7	5.9	1.59
Rheumatic diseases	3.6	15.1	4.19	12.8	21.0	1.64
Diseases of the nervous system	1.3	.7	.54	3.1	3.3	1.06
Diseases of the skin	1.9	1.0	.53	3.0	1.9	.63
Other infectious and parasitic diseases	4.8	5.9	1.23	3.2	3.5	1.09
Other nonrespiratory-nondigestive diseases	3.5	3.3	.94	6.4	5.0	.78
Ill-defined or unknown diagnoses	1.0	2.9	2.90	1.5	2.2	1.47
Number of person-years of membership	18,013.1	3,043.6		34,004.5	5,422.8	

The frequency rate for most specific diseases for both races is greater for males 35 years of age and over than for those under 35 years. As was found in the soap manufacturing industry (*6*), so also for white males in the meat packing industry there were three diagnoses, diseases of the pharynx and tonsils, appendicitis, and infectious and parasitic diseases, which declined in frequency with age. These same diseases showed a decline for Negro males, but, in addition, nonindustrial injuries, pleurisy, and respiratory tuberculosis likewise decreased. This does not indicate that there was a favorable trend among Negroes for such diseases, but merely that they had a particularly high rate in the younger age group. The same reasoning applies to the generally lower rate of increase with age for Negro as compared with white males.

It will be noted that the highest ratios of Negro to white rates include the more serious respiratory diseases, diarrhea and enteritis, and genitourinary and rheumatic diseases.

Frequency of disabilities according to occupational group and diagnosis.—Occupation may influence the frequency and severity of disabilities both directly by the conditions of the working environment and indirectly by the effect of earnings translated into terms of housing and living conditions. The generally higher rates for Negroes may not, therefore, be due to racial differences but to differences in the type of work performed and in the amount of remuneration received.

In an attempt to reduce the possible influence of these disturbing factors, data for warm and cold meat workers were separated from those for all other workers, as shown in table 3. The former group represents an occupation in the meat packing industry which involves the slaughter of animals, splitting of carcasses, removal of hides, entrails, and other portions, sawing of heads and legs, trucking into the cooler room, and cutting, trimming, and boning the cold meat. Although there are many different operations performed, and it is possible that Negro and white workers may be assigned different tasks, yet the general working environment is the same. Since the floors are continually under a spray of water to wash down the blood and other matter, and the carcasses are repeatedly washed and flushed, all workers are exposed to a very damp environment. Moreover, much of the labor is quite strenuous.

TABLE 3.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, annual number of days of disability per male and average number of days per case, among warm and cold meat workers and all other workers, by age, under 35 years and 35 years and over, according to broad diagnosis group, white male and Negro male employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis group	Under 35 years of age					
	Warm and cold meat workers			All other workers		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
	ANNUAL NUMBER OF CASES PER 1,000 MALES					
Total, all diagnoses [1]	100.9	116 5	1.15	67.5	127.0	1.88
Nonindustrial injuries	18 3	20.8	1.14	11.2	24.7	2.21
Respiratory diseases	43.5	50.3	1.16	27 4	51 8	2 00
Digestive diseases	10.2	13.5	1.32	10.8	13.0	1.20
Nonrespiratory-nondigestive diseases	28 1	31.9	1.14	17.1	30 5	1 78
	ANNUAL NUMBER OF DAYS OF DISABILITY PER MALE					
Total, all diagnoses [1]	2.82	3.52	1.25	1.86	2 98	1 60
Nonindustrial injuries	.44	.70	1.59	.28	.40	1.43
Respiratory diseases	.91	1.40	1 54	.63	1.28	2.03
Digestive diseases	.44	.40	.91	.40	26	.65
Nonrespiratory-nondigestive diseases	1 02	1.02	1 00	53	97	1 83
	AVERAGE NUMBER OF DAYS PER CASE					
Total, all diagnoses [1]	28.0	30 2	1.08	27.5	23 5	0 85
Nonindustrial injuries	24 3	33 5	1.38	24.8	16 2	.65
Respiratory diseases	20.8	27.8	1 34	23 1	23 3	1.01
Digestive diseases	43.4	29.9	.69	36 7	20 3	.55
Nonrespiratory-nondigestive diseases	36.5	32.1	.88	31 1	31 7	1.02
Number of person-years of membership	2,458.6	815 5		15,554 5	2,228 1	

Diagnosis group	35 years of age and over					
	Warm and cold meat workers			All other workers		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
	ANNUAL NUMBER OF CASES PER 1,000 MALES					
Total, all diagnoses [1]	144.5	166.4	1.15	101.4	138 0	1.36
Nonindustrial injuries	19 5	16.4	.84	13.4	15.7	1.17
Respiratory diseases	49.5	78 4	1 58	34.8	57.1	1.64
Digestive diseases	18.7	15.0	.80	13.5	14 7	1.09
Nonrespiratory-nondigestive diseases	54.6	52.5	.96	38.3	49.0	1.28
	ANNUAL NUMBER OF DAYS OF DISABILITY PER MALE					
Total, all diagnoses [1]	4 99	5.05	1.01	3.60	4.32	1 20
Nonindustrial injuries	.56	.43	.77	.40	.45	1.12
Respiratory diseases	1 41	1 92	1.36	.94	1.50	1 60
Digestive diseases	.73	.39	.53	.57	.49	.86
Nonrespiratory-nondigestive diseases	2 21	2 26	1 02	1 66	1 85	1 11
	AVERAGE NUMBER OF DAYS PER CASE					
Total, all diagnoses [1]	34.5	30.4	0 88	35.5	31.3	0.86
Nonindustrial injuries	28.6	26 4	.92	29.8	28.9	.97
Respiratory diseases	28.4	24 5	.86	27.0	26.2	.97
Digestive diseases	39 1	26 1	.67	42.6	33.3	.78
Nonrespiratory-nondigestive diseases	40 5	43.0	1.06	43.3	37.6	.87
Number of person-years of membership	4,504.7	1,466.6		29,490.8	3,956.2	

[1] Includes some cases of ill-defined or unknown diagnosis.

For white males both under 35 years and 35 years and over the frequency rates for warm and cold meat workers were higher than for any other occupational group. As shown in table 3 and in figure 3, when the rates for white and Negro males of this specific occupational group are compared, the excess in the Negro rate is found to be 15 percent for each of the broad age groups; among "all other workers" the rate was 88 percent in excess for Negro males under 35 years and 36 percent in excess for those 35 years of age and over. The difference, especially for younger persons, is related to the fact that there is a large group of white males engaged in office work, an occupation which normally has a low frequency of disabilities, while there are very few Negro males employed in this type of work. Thus the apparent influence of race is greatly lessened when comparison is

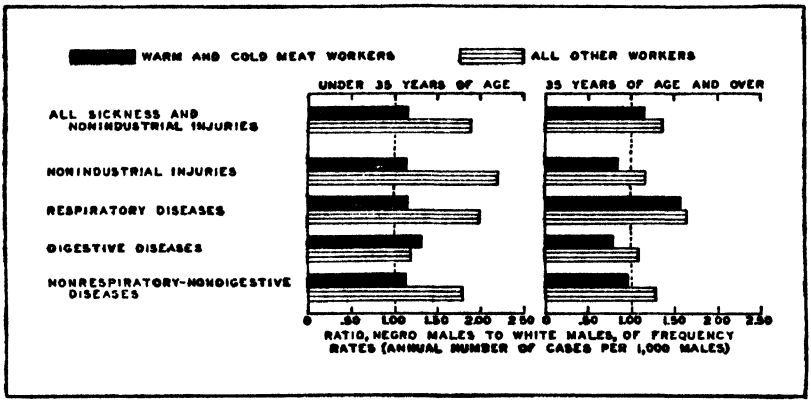

FIGURE 3.—Ratio, annual number of cases per 1,000 Negro males to annual number of cases per 1,000 white males, of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, by ages under 35 years and 35 years and over, according to broad diagnosis groups, employees in the slaughter and meat packing industry, 1930-34, inclusive.

made between Negro and white males of similar occupational groups. Even in dissimilar occupational groups, the effect of increasing age is to reduce racial differences. This is possibly due to the fact that the rate among Negroes is already high in the younger age groups and does not increase so rapidly with advancing age as the rate among white males, which starts at a much lower level.

Among warm and cold meat workers under 35 years, it will be observed that the excess in the frequency rate for Negroes occurs to almost the same extent for nonindustrial injuries, respiratory diseases, and nonrespiratory-nondigestive diseases. The rate for digestive diseases among Negroes is slightly more unfavorable. Although for the older age group the excess for all causes is the same as for younger persons, the distribution of the excess according to diagnosis group is quite different. The rate for respiratory diseases is 58 percent greater for Negro than for white males, but for the other 3 diagnosis groups

the Negro rate is more favorable. Apparently the equalizing factor of increasing age, when added to similarity of occupation, eliminates much of the racial difference, except for respiratory diseases. Other than for this diagnosis group, Negro warm and cold meat workers would appear to have a better health record than whites engaged in the same work.

When the Negro-to-white ratio of "all other workers" for the two age groups is compared, a decided decrease is noted in the older group. For each diagnosis group the white rate increases with age at a higher rate than does the Negro rate, the difference between the two rates becoming less. Possibly age has a selective effect, causing differences in occupational status to become less marked. In other words, there may not be as many very low paid and unskilled workers among the older employees who may be presumed to have had longer service with the company.

The annual number of days of disability per person among warm and cold meat workers was 25 percent greater among young Negroes and almost the same for both races among the older males; for "all other workers" the excesses among Negroes were 60 and 20 percent, respectively. Here again is an indication that racial differences are reduced by increasing age and by greater specificity of occupation. Respiratory diseases are again the only diagnosis group that is distinctly unfavorable among old as well as young Negroes.

Warm and cold meat workers 35 years of age and over and "all other workers" of both age groups showed a lower average number of days per case for Negro males than for white males, the ratios in the three instances being almost the same. Negro warm and cold meat workers showed a very slight increase with age in average number of days per case, while white males in the same occupation showed a marked increase. This resulted in a much more favorable Negro-to-white ratio in the older age group. "All other workers," who had a favorable Negro ratio when young, had a less favorable ratio in the older group. According to the average duration per case for persons under 35 years, when similar occupations were compared the Negro and the white rates were more nearly alike, although the Negro rate was unfavorable.

Frequency of disabilities among laborers.—The data given in table 4 further confirm the possible relationship previously indicated, namely, that as employment status becomes more nearly alike, the difference between the disability rates for Negroes and whites tends to decrease. Although laborers form a rather broad socio-economic class, still the excess in the Negro frequency rate among laborers for all diagnoses is less than the corresponding excess for all socio-economic groups. Laborers work throughout the plant, both inside and outside, and are subjected to wide differences in exposure; however, they have in

common the fact that they are unskilled and receive relatively low wages. Lack of sufficient income is likely to be reflected in home conditions and standards of living. It is these factors, apparently, rather than common environmental experience in the plant, which reduce the difference between the white and Negro rates.

TABLE 4.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer among laborers and all socio-economic groups, according to diagnosis group, white male and Negro male employees in the slaughter and meat packing industry, 1930 to 1934, inclusive*

Diagnosis group	Annual number of cases per 1,000 males					
	All socio-economic groups			Laborers		
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white
Total, all diagnoses	95.0	137.9	1.45	104.6	130.4	1.25
Nonindustrial injuries	13.5	18.6	1.38	15.5	16.0	1.03
Respiratory diseases	34.3	59.6	1.74	39.1	55.6	1.42
Digestive diseases	13.0	14.1	1.08	12.3	14.1	1.15
Nonrespiratory-nondigestive diseases	32.9	43.1	1.31	36.1	42.3	1.17
Diseases of the circulatory system	6.1	7.0	1.15	5.9	6.7	1.14
Genitourinary diseases	2.9	4.6	1.59	2.8	5.0	1.79
Rheumatic diseases	9.6	18.9	1.97	13.1	17.3	1.32
Diseases of the nervous system	2.5	2.3	.92	1.6	2.0	1.25
Diseases of the skin	2.7	1.5	.56	3.9	2.0	.51
Other infectious and parasitic diseases	3.7	4.4	1.19	3.7	4.9	1.32
Other nonrespiratory-nondigestive diseases	5.4	4.4	.81	5.1	4.4	.86
Ill-defined or unknown diagnoses	1.3	2.5	1.92	1.6	2.4	1.50
Number of person-years of membership	52,138.8	8,476.4		17,355.1	5,951.3	

It will be observed that Negro laborers differ most from white laborers with respect to respiratory diseases, and least with respect to nonindustrial injuries. For each of the four principal diagnosis groups, digestive diseases excepted, there is less difference between the white and Negro rates for laborers than for "all socio-economic groups." The actual rate for Negro laborers was lower than the Negro rate for "all socio-economic groups," while the reverse was true among white males, who showed a higher rate for laborers. Digestive diseases again were the exception. Certain nonrespiratory-nondigestive diseases showed a higher Negro-to-white ratio for laborers than for "all socio-economic groups," namely, genitourinary diseases, diseases of the nervous system, and infectious and parasitic diseases.

Mortality and fatality rates.—Despite the comparatively small number of deaths, there are certain observations concerning fatality and mortality rates among Negro and white males which are noteworthy. Table 5 shows that, while the Negro mortality rate is 57 percent greater than the white rate, the corresponding fatality rate is only 10 percent greater. As with morbidity, the greatest excess occurs for respiratory diseases. Pneumonia and respiratory tuberculosis account for 35 percent of all Negro deaths compared with 19 percent

TABLE 5.—*Annual number of deaths per 1,000 males, and percent of cases ending fatally, according to diagnosis group, white male and Negro male employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis group	Annual number of deaths per 1,000 males			Percent of cases ending fatality			Number of deaths		Number of ended cases	
	White	Negro	Ratio, Negro to white	White	Negro	Ratio, Negro to white	White	Negro	White	Negro
Total, all diagnoses	5.8	9.1	1.57	5.9	6.5	1.10	300	77	5,048	1,179
Nonindustrial injuries	1.0	1.2	1.20	7.2	6.1	.85	54	10	745	165
Respiratory diseases	1.3	3.3	2.54	3.5	5.5	1.57	64	28	1,814	508
Pneumonia, all forms	.5	1.1	2.20	25.3	27.3	1.08	24	9	95	33
Respiratory tuberculosis	.6	2.1	3.50	39.3	75.0	1.91	33	18	84	24
Other respiratory diseases	.2	.1	.50	.4	.2	.50	7	1	1,635	451
Digestive diseases	.3	.4	1.33	2.5	2.5	1.00	17	3	676	122
Appendicitis	.1	-----	-----	1.8	-----	-----	4	---	219	16
Other digestive diseases	.2	.4	2.00	2.8	2.8	1.00	13	3	457	106
Nonrespiratory-nondigestive diseases	3.1	4.1	1.32	9.3	9.6	1.03	162	35	1,741	363
Diseases of the circulatory system	1.4	2.0	1.43	19.6	27.4	1.40	70	17	358	62
Genitourinary diseases	.3	.7	2.33	10.8	16.7	1.55	17	6	157	36
Diseases of the nervous system	.4	.4	1.00	13.5	16.7	1.24	18	3	133	18
Other nonrespiratory-nondigestive diseases	1.0	1.0	1.00	5.2	3.6	.69	57	9	1,093	247
Ill-defined or unknown diagnoses	.1	.1	1.00	4.2	4.8	1.14	3	1	72	21

Number of person-years of membership: White males, 52,138.8; Negro males, 8,476.4.

of all white deaths. Respiratory tuberculosis occurs more frequently among Negro males and it has a high fatality rate, with three-fourths of the cases recorded ending in death. Digestive diseases and nonrespiratory-nondigestive diseases cause a third more deaths among Negroes than whites, per 1,000 members of the sick benefit organization, although the percentage ending fatally is almost the same for the two races.

It will be observed that the excess in the Negro mortality rate is only slightly greater than the excess in the frequency rate for all sickness and nonindustrial injuries. The unfavorable morbidity and mortality experience of Negro males appears not to differ greatly as a whole, although the two rates vary by diagnosis group. In both, the greatest Negro excess is for respiratory diseases, which amount to 74 percent for the frequency rate and 154 percent for the mortality rate. Nonrespiratory-nondigestive diseases show almost the same frequency and mortality excesses, namely, 31 and 32 percent, respectively.

Mortality and fatality rates by occupation show little difference in the Negro to white ratio from the corresponding ratio for all occupations. The excess in the Negro mortality rate for warm and cold meat workers is 42 percent, while for all occupations it is 57 percent. The corresponding fatality rates show an excess of 23 and 10 percent, respective

SUMMARY

The results of this study of sickness and nonindustrial injuries among white and Negro male employees of certain slaughter and meat packing companies may be conveniently summarized as follows:

1. As the occupations of Negro and white males become more nearly alike, the magnitude of the excess in the frequency rate of disabilities among Negroes tended to decrease, if not to disappear entirely. This suggested that it was differences in the type of work performed together with the associated economic status rather than race per se which produced the unfavorable Negro health record when occupation was not held specific. Disregarding occupation, increasing age had the effect of reducing racial differences, since the Negro rate showed a tendency to increase less rapidly than the white. The rates for respiratory and rheumatic diseases remained unfavorable for Negroes and were less subject to the equalizing influence of occupation and age.

2. Although the Negro mortality rate was 57 percent greater than the white rate, the fatality rate was only 10 percent greater. With respect to neither of these rates did the Negro to white ratio show as marked a decrease when occupation was made specific, as did the morbidity rates.

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THE PRESENCE OF HISTAMINE IN THE PLATELETS OF THE RABBIT [1]

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The work of Loos (*1*) first suggested that histamine is carried by polymorphonuclear cells. This worker found in the rabbit an increase in the histamine content of inflammatory areas which ran parallel to the polymorphonuclear infiltration. Schwartz (*2*) showed that a histaminelike activity was present in defibrinated blood and thought that this was released from the white cells and platelets at the time of coagulation. Code (*3*) demonstrated that the buffy coat of blood carried a large fraction of the total blood histamine under normal conditions and thought that it was the granulocytic series of cells and especially the eosinophiles which were involved. In certain acute conditions, such as anaphylactic shock, insulin reactions, and following toxic drugs, it has been shown that histamine appears free in plasma, being released from injured tissues and the buffy coat (*4, 5, 6, 7, 8*). This plasma histamine is rapidly removed by several mechanisms which have been discussed by Rose and Browne (*9*).

In studying blood histamine changes both in clinical cases and in animal experiments, we have been unable to interpret the findings upon the basis that the white cells carry histamine at any time. Because of this, it was necessary to study more closely the histamine content of the various blood constituents. This paper deals with the findings in rabbits.

Histamine was determined chiefly by Code's modification of the Barsoum and Gaddum technique (*10*). This method was confidently used because it was found possible in several experiments to destroy almost completely the activity of the final water extracts by sterile incubation with a commercial preparation of histaminase.[2] The findings of Anrep et al. (*11*), however, suggested that it would be wise to repeat some of the experiments using alcohol extraction, as done in Barsoum and Gaddum's method (*12*), to make certain that there were no wide fluctuations in the alcohol insoluble material (presumably not histamine) which may be present in the water extracts.

The differences in the values obtained by extracting the final residue with water according to Code's method and four times with 2 cc. of alcohol as suggested by Anrep et al. (*11*) are shown in table 1 and table 3. The result of this comparison indicates that the findings in experiment 3 on platelet-containing plasma are valid, whether

[1] From the Clinical Research Laboratory, U. S. Marine Hospital, Baltimore, Md.

[2] Supplied through the courtesy of the Winthrop Chemical Co., Inc.

alcohol or water extraction is used. The values for whole blood are smaller with alcohol extraction, but it may be seen from table 3 that wide fluctuations in blood histamine are adequately shown by either method. This is in agreement with the findings of Barsoum and Gaddum (*12*) to the effect that in rabbit blood the alcohol extraction may be omitted.

The precision and accuracy of the method in our hands using water extraction may be judged from the duplicates and recovery experiments shown in table 1. Since it was necessary to work with heavily oxalated blood (about 10 mg. potassium oxalate per cc.), controls were run which showed that whole blood values are essentially the same when coagulation was inhibited using potassium oxalate, sodium citrate, or Heparin. The last two anticoagulants did not protect the platelets as well, however, as potassium oxalate. All samples were run in as comparative a manner as possible, those of table 3 being run simultaneously with the control and titrated upon the same piece of guinea-pig intestine. All values are in gammas of the free base.

TABLE 1.—*Comparative histamine values of water and alcoholic extracts and dependability of histamine assay method*

Whole blood (gammas per cc.)		Turbid plasma (gammas per cc.)		Red cells (gammas in R. B. C. in 1 cc. whole blood)	
Water extract	Alcohol extract	Water extract	Alcohol extract	Water extract	Alcohol extract
2.76	1.77	2.72	2.56	0.10	0.09
2.33	2.14	1.35	1.18	.37	.34
3.00	2.20	4.65	4.40	.51	.20
1.45	1.31				

WATER EXTRACTIONS

Material	Recovery (gammas)		Duplicates (gammas per cc. blood)	
	Added	Found	First sample	Second sample
Blood	3.00	2.68	3.01	3.28
Distilled water	3.27	3.36	3.75	3.54
Blood	6.00	5.12	2.16	2.14
Plasma	6.00	5.66	4.5	4.9
Distilled water	6.54	6.32	1.80	1.82
Blood	9.00	7.49	.08	.078
Blood	9.00	8.65	.88	.94

EXPERIMENT 1

Table 2 is made up from an experiment originally intended to demonstrate the changes in blood histamine following vaccine administration. These rabbits were sensitized to a strain of b-hemolytic streptococcus of low virulence. Following the intravenous adminis-

tration of 10 cc. of the killed homologous vaccine to sensitized animals and also to nonsensitized controls, blood samples were withdrawn after 5 to 10 minutes and platelets, white cells, and histamine were determined. These values are compared with control samples of blood drawn just before administration of vaccine. It may be seen that there can be an almost complete disappearance of granulocytic cells with little change in histamine content. Further, there is no increase in the plasma histamine, which rules out any shift in histamine from injured white cells to plasma. These observations suggested the investigation of platelets.

TABLE 2.—*Histamine values following white-cell reduction by means of streptococcal vaccine*

Rabbit No.	Time interval (min.)	Blood histamine (gammas per cc.)		Polymorphonuclears (per cu. mm.)		Platelets (thousand per cu. mm.)		Plasma histamine (gammas per cc.)	
		Before	After	Before	After	Before	After	Before	After
14	5	2 76	0.60	5,100	9	350	210	0.18	0.13
0	5	2 60	.39	2,450	22	545	95	.80	.27
27	5	2.58	.85	1,820	8				.18
16	5	2 40	.68	3,200	16	730	350		
24	6	.96	1.17	2,670	21		350	.72	.16
22	10	1 63	1 18	1,395	0			.48	.50
25	10	1 17	1.34	1,092	100			.57	.15
11	10	2 7	1 47	2,850	550	550	485	.72	.16
28	10	2.18	.87	2,800	26	275	315		

When attention was focused upon the platelets it was found that 5 minutes after the vaccine injection there was usually a drop in platelets parallel to that of the white cells. At the 10-minute interval the platelets recover their normal value, while the white cells are still reduced. Later, at the 1- to 3-hour stage, the platelets are above the initial value and the white cells have also risen slightly above normal. These findings are in agreement with those of Aynaud (*13*) and Bull and McKee (*14*), who found somewhat the same blood changes following injection of bacteria.

Since there may be a difference in the number of platelets between heart and peripheral blood (*20*), it was necessary to count the platelets in the same sample that was drawn for histamine analysis. This introduced error in counting, since the platelets have a tendency to clump. This fact, coupled with the difficulty of catching the sequence of changes at just the moment that the white cells are depressed and the platelets are at a normal level, suggested that the relationship must be demonstrated by some more controllable method.

EXPERIMENT 2

Anti-rabbit-platelet serum was made in guinea pigs by the method of Bull and McKee (*14*). Intraperitoneal injections of washed plate-

lets from 50 cc. of rabbit blood were given each pig three times at weekly intervals. Seven days following the last injection the pigs were bled and serum removed. Care was taken to remove red and white cells from the washed platelet material by differential centrifugation, in order that the resulting serum should be as specific as possible. The immunological properties of such sera have been described by Bedson (*15*, *16*).

Table 3 shows the results of intravenous injection of between ¾ and 2 cc. of the antiplatelet serum (amount depending upon size of rabbit and potency of serum). Blood was drawn just before serum was given, as a control sample.

TABLE 3.—*Histamine values in relation to platelet, polymorphonuclear, and mononuclear cell counts before and after the administration of antiplatelet serum. Controls showing effect of bleeding and normal serum*

Rabbit No.	Time interval (hour)	Blood histamine (gammas per cc.)		Platelets (X 10-3)		Polymorphonuclears (per cu. mm.)		Mononuclears (per cu. mm.)		Remarks
		Before	After	Before	After	Before	After	Before	After	
21	4½	2.40	0.55	500	75	2,975	4,225	6,625	5,725	
28	4½	1.80	.08	500	50	4,750	5,755	5,250	3,240	Died with purpura.
11	4	3.02	.06	434	17	2,060	9,525	8,775	1,680	Died.
7	1½	1.87	.80	775	190	2,320	2,410	2,730	3,470	
7	4	1.13	.075	340	30	955	826	4,075	2,020	Died with purpura.
13	4½	3.38	1.15	600	135	3,150	7,425	8,750	2,475	
18	4½	2.06	.29	472	102					
19	8	1.59	.15	423	38	2,610	3,680	5,190	2,670	
20	4	3.75	2.92	515	120	6,500	8,950	5,100	2,390	
8	4	1.40	.65	317	180	2,650	4,700	7,350	4,700	
14	4½	4.60; [1] 3.80	1.74; [1] 1.29	638	434	3,745	8,125	9,625	4,150	
27	4	2.46; [1] 1.72	.09; [1] .07	558	78	1,860	3,910	5,290	690	
21	[2] 5	2.50; [1] 2.06	.35; [1] .35	412	52	4,745	1,080	6,030	2,845	Died; bled after death.
13	3	3.06	3.00	624	337	2,300	2,575	8,650	8,625	
1	4	1.85	1.20	592	633	4,360	5,485	3,640	5,265	
2	18	3.20	2.94	650	650	9,250	4,240	4,350	6,360	
25	6	2.31	2.60	600	440	4,375	5,760	13,125	7,040	1 cc. normal G. P. serum.
21	4	4.20	3.75	462	218	4,105	2,925	5,445	4,125	

[1] Alcohol extractions.
[2] Minutes.

For the sake of brevity, the results of only the 1- to 4-hour samples are shown. In four of these rabbits, blood was also withdrawn after 18 to 24 hours. In every case the platelets and blood histamine were still depressed, while the white cells had returned almost to normal. This suggests that the changes are not due to some evanescent cause and agrees well with the findings of Tocantins (*17*) that it takes several days for platelets to recover after antiplatelet serum. The control

rabbits cover the possibility that the changes are due to the effects of the bleeding alone. Three rabbits died, two of which were autopsied. These showed a gross picture similar to that reported for guinea pigs and dogs receiving antiplatelet serum (*16*, *18*).

The results of this experiment are definite and clearly suggest that it is the platelets which carry the major portion of the blood histamine. There are, however, two objections which may be raised. The first is that the other blood elements have been injured by anti-white-cell and anti-red-cell properties of the serum (Bedson (*15*)) and have released their histamine which has been removed from the plasma by the mechanisms referred to above. The change in the platelets might thus be merely a concomitant feature. The second point is that, although there appears to be a relation between a drop in platelets and a drop in blood histamine, the relation between the number of platelets and the histamine value is poor. The following experiment is designed to cover the first point, while the second one will be discussed later.

EXPERIMENT 8

Rabbit blood was drawn into syringes containing powdered potassium oxalate and rapidly mixed. The oxalated blood was centrifuged briefly. The turbid plasma was then fractionally centrifuged. Platelet and white blood cell counts and histamine determinations were performed upon the different samples. Figure 1 shows the relationship found. The abscissa represents gammas of histamine per cc. of oxalated plasma, the ordinate, platelets and white cells per cu. mm.

The character of the curve may be explained as follows: The platelet count undoubtedly includes a certain proportion of pseudoplatelets and cellular debris. Tocantins (*20*) has called attention to this difficulty in the counting of wet preparations. Such elements will give an additive factor to the ordinate values. The smallest of the platelets will carry little histamine and sediment very slowly, and thus cause the line to drop steeply, cutting the abscissa at the value of 0.13 gammas, which represents the amount of histamine dissolved in the oxalated plasma.

In figure 1 the ordinate and abscissa are of equal length and the constants chosen so that each arm is almost equal to the range of values. The curve thus represents proportionate changes. The platelets make a line roughly 45°, which suggests that they are the carriers of histamine, while gross proportionate changes in the white count produce little histamine change, and in the lower values no change in the white cells is associated with considerable histamine change. The number of white cells is also entirely out of proportion to normal blood findings. For instance, the average number of white

cells at the histamine value of 1 gamma is about 75 cells per cu. mm. Normal blood containing 5,000 to 8,000 cells should then contain 65 to 100 gammas of histamine per cc. if the histamine were carried by the white cells present. The determinations were carried out in groups of 5 to 6 samples from the same plasma. The most heavily centrifuged plasma in each group constitutes a control for the preceding samples of the group. There is little chance then that there is

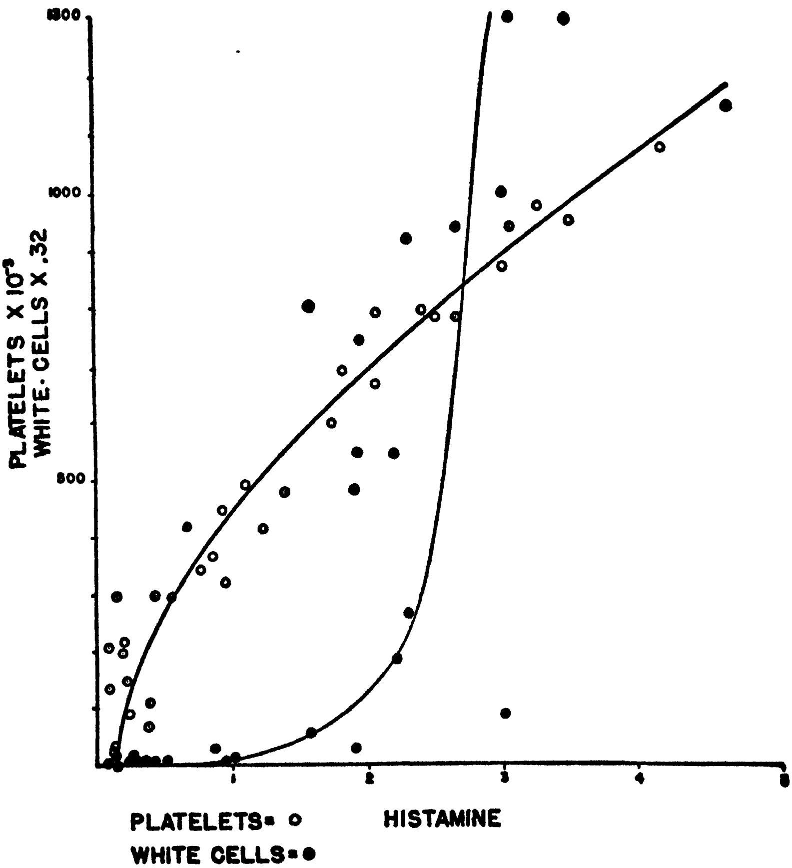

FIGURE 1.—The relationship of histamine values to platelets and leucocytes in oxalated plasma.

dissolved histamine much above the value of 0.13 gammas in any of the determinations. Doubts as to accuracy of platelet counts done on whole oxalated blood are not applicable to this experiment. The clumps of platelets are removed by the preliminary sedimentation, and the counts in these experiments were reproduceable within the limits of sampling error.

Whatever the explanation of the peculiarities of the relation found, considering the inaccuracies of both histamine determinations and

platelet counts, there seems a definite relation of platelets to histamine content in the oxalated plasma.

There exists the possibility that histamine is released from white cells on being injured by oxalate and that it is adsorbed by platelets. When 9 gammas of histamine were added to 5 cc. of oxalated blood, mixed, and allowed to stand 20 minutes, and then fractionated and assayed along with a control sample, 80 percent of the recovered histamine (94 percent total recovery) was recovered from the plasma, 13.5 percent in the buffy coat, and 6.5 percent in the red cells. These are the averages of two experiments which agree fairly well. When 4.5 gammas of histamine were added to 5 cc. of oxalated plasma containing platelets, the platelets contained 30 percent of the total added histamine, while the plasma contained 70 percent. It may be seen from these results that histamine added to whole blood and also platelets is adsorbed to a certain extent. The plasma, however, contains the greatest fraction of the added histamine. This indicates that if there were some transfer of histamine from injured or disintegrated white cells to the platelets under the conditions in the oxalated plasma, we should expect a large proportion of the total histamine to be present in the plasma. From table 2 and figure 1 it may be seen that this is not the case.

The average histamine content of the whole blood of the 8 rabbits contributing plasma to experiment 3 (unfortunately not determined at the same time as the samples in experiment 3) was 1.82 gammas per cc. The average platelet count was 515,000 per cu. mm. blood. The curve in figure 1 predicts a value of 1.25 gammas per cc. for the number of platelets. To this may be added the value of 0.49 gammas, the amount of histamine in the red cells in 1 cc. of whole blood (average of 10 determinations) giving 1.74 gammas per cc. This value for red cells was determined by analysis of centrifuged packed red cells drawn from the bottom to minimize contamination with the buffy coat. The value is very definitely a maximum one, for the cells were thus not washed. It may be noted also that the plasma values given in table 2 are too large, because at the time of these determinations the fact that a slightly turbid plasma might contain numerous suspended platelets was not fully appreciated. The value of 0.13 from figure 1 is probably more nearly correct. We can account, then, for from 1.25 to 1.74 gammas of the 1.82 average blood histamine value. This discrepancy may be due to experimental errors, the presence of small amounts of histamine in the white cells, or to the fact that the platelets examined in experiment 3 were obtained by differential centrifugation, thus losing the larger-sized platelets which would carry more histamine.

There remains the question as to why the histamine value is not more directly dependent upon the absolute number of platelets (see

table 3). We have noticed that the histamine value for an individual rabbit usually remained constant for long periods of time. The blood histamine 5 to 14 days following an episode of platelet decrease caused by antiplatelet serum was frequently two to three times as high as in a previous resting period. The platelet count at such times was not correspondingly increased.

Bedson (*19*), Tocantins (*17*), and others have pointed out that following administration of various agents which decrease the platelets, regenerative processes are set in motion which replace and even exceed the normal number of platelets. The regenerating platelets are different in morphology and size from resting platelets. The increase in histamine following antiplatelet serum may, therefore, be associated either with an increased histamine content of the individual platelet or an increase in average size (since the numbers are not increased). This physiological variation in the platelets which must also occur in the normal rabbit to a lesser degree possibly accounts for the lack of direct relation between the platelet number and the histamine content.

It has long been known that platelets contain pharmacologically active substances. Tocantins (*20*) in his review of this point remarks that some of the extracts behave like histamine. The work of Barsoum and Gaddum (*12*) and also Code (*10*) made it highly probable that the material extracted by their techniques is in reality histamine. The inactivation by use of the specific enzyme upon such extracts by Best and McHenry (*21*), Anrep et al. (*11*), and Bachman (*8*) brings the proof just short of chemical identification. It seems to follow, then, that at least one of the pharmacologically active substances in the platelets of the rabbit is histamine. From the foregoing experiments it seems also that the platelet is the chief carrier of the blood histamine in the rabbit.

SUMMARY

1. It has been found that the white cells of the rabbit may be markedly depressed without significant change in blood histamine.

2. The administration of antiplatelet serum caused a significant drop in blood histamine along with a drop in platelets.

3. Fractional centrifugation of platelet-containing plasma removes histamine nearly in proportion to the platelets removed.

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THE SUSCEPTIBILITY OF FIVE INBRED STRAINS OF MICE TO LIVER CHANGES INDUCED BY SUBCUTANEOUS INJECTION OF 2-AMINO-5-AZOTOLUENE [1]

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The carcinogenic property of 2-amino-5-azotoluene (o-amidoazotoluol) has received considerable attention since Yoshida (*7*), in 1933, reported the occurrence of hepatomas in rats which were fed a diet containing the compound. Yoshida (*8*) also recorded the induction of hepatomas in rats following subcutaneous injections of o-amidoazotoluol, and similar results with mice were obtained by Shear (*6*). Comprehensive reviews of the investigations have been published by Shear (*6*) and by Kinosita (*5*).

It was considered advisable to determine the susceptibility of various inbred strains of mice to the production of liver tumors following subcutaneous injections of the compound. Since inbred strains of

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mice show wide variations in susceptibility to subcutaneous and pulmonary tumors induced by carcinogenic hydrocarbons (*1*), and since the susceptibility to induced lung tumors is correlated with their spontaneous occurrence, it seemed of interest to ascertain the relative susceptibilities of the strains to induced liver tumors, in order to determine, if possible, whether the incidence of spontaneous hepatomas is correlated with the incidence of induced liver growths. The primary object of the investigation, however, was to find out which strains are most suitable for investigations in which 2-amino-5-azotoluene is used as a carcinogen.

EXPERIMENTAL

Ten strain A males, 10 strain C_3H males, 15 strain Y (6 females and 9 males), 20 strain I (10 females and 10 males), and 14 strain C female mice were used, all of which were raised in this laboratory. Mice of strains A and C are albino animals; strain I are pink-eyed mice and have a very light coat color, while strain C_3H (black agouti) and strain Y (black or brown) are dark colored animals. The C_3H, Y, and I mice were 6 weeks of age and the A and C mice were 3 months old. The animals were fed a diet of Purina dog chow throughout the experiment.

Cloudman, Bittner, and Little (*4*) record an incidence of 0 percent liver tumors in mice of strain A, and in an earlier publication from this laboratory (*2*) it was shown that approximately 25 percent of the males of strain C_3H have hepatomas when 1 year of age or older. The liver tumor incidence of strains C, I, and Y is not reported, but autopsy records obtained in this laboratory are of some assistance in this respect. Hepatoma was not observed in 47 (40 female and 7 male) mice of strain Y which were at least 1 year of age, while of 101 (76 females and 25 males) strain I mice over 1 year of age 6 (5 females and 1 male), or 6.0 percent, had liver growths. It is believed these data are sufficient to show that liver tumors are not common in mice of strains Y or I. Information concerning liver tumors in mice of strain C is not available.

The 2-amino-5-azotoluene was obtained from the Eastman Kodak Co. and was used without purification. Shear's technique (*6*) was used for administration; the compound was moistened with glycerol and injected subcutaneously in the right axilla. Each injection consisted of approximately 10 mg. of the compound. The injections were begun in October 1937, and were repeated at monthly intervals until a total of 11 injections had been given; thus, each animal living until the conclusion of the experiment received a total of 110 mg. of the compound.

All mice survived 18 weeks after the first injection. During the following 18 weeks, 6 animals (2 strain A, 1 strain C_3H, 2 strain Y males, and 1 strain I male) died without macroscopic changes in the livers. During the thirty-sixth week of the experiment a strain C mouse died and at autopsy 6 nodular masses were found in the liver. Beginning 36 weeks after the first injection all mice dying or sacrificed were necropsied, the degree of macroscopic liver change was noted, and portions of the liver were stained for histologic studies, which are still in progress.

Twenty-six mice (8 strain A, 8 strain C, 1 strain I male, 4 strain Y females, and 5 strain Y males) died or were killed between the thirty-sixth week and the termination of the experiment. Most of the strain A and strain C mice had palpable intra-abdominal masses before death and at autopsy all showed pronounced macroscopic liver changes, but it was not possible to state with certainty whether death was due to the toxic action of the compound or to the effects of liver growths. Most of the strain Y animals which died or were killed had severe ulceration of the skin which could not be associated with injections of the compound because the same condition occurs in normal untreated mice of this strain. The degree of liver change in the Y mice was less pronounced than in mice of strains A or C; of the 9 Y mice necropsied 4 showed no macroscopic changes in the livers.

The experiment was terminated on October 26, 1938, 1 year after the first injection. At that time 37 mice (6 strain C, 9 strain C_3H, 10 strain I females, 8 strain I males, 2 strain Y females, and 2 strain Y males) were living.

The results of the macroscopic examinations are summarized in table 1, which includes only the animals living 36 weeks after the first injection.

TABLE 1.—*Summary of macroscopic findings in livers of 5 strains of mice following subcutaneous injections of 2-amino-5-azotoluene*

Strain	Sex	Number injected	Number showing pronounced liver changes	Number showing moderate liver changes	Number showing no liver changes
C	Female	14	11	3	0
A	Male	8	3	4	1
I	Female	10	6	4	0
I	Male	9	1	5	3
C_3H	Male	9	1	8	0
Y	Female	6	0	3	3
Y	Male	7	0	2	5

In the fourth column of the table is listed the number of mice showing pronounced liver changes. There was marked enlargement of the liver, which was cirrhotic in appearance and contained masses, many of which protruded from the surface, while some were peduncu-

lated. The masses were multiple, from 10 to over 30 in each liver, were round or oval in shape, and measured from 4 to 20 mm. in diameter. Some were white or yellow and homogenous in color while others were red, probably owing to hemorrhage. The white masses were of firmer consistency than the yellow or red ones. The yellow masses had prominent surface blood vessels and many were pedunculated. A single liver often showed abnormalities of all 3 types.

In the fifth column of the table is given the number of animals showing only moderate liver changes. In the majority of these mice the livers were not noticeably enlarged and appeared normal when examined macroscopically, but contained from 1 to 6 definite masses. Some of the livers were diffusely mottled but contained no definite masses. In the last column is listed the number of mice which had macroscopically normal livers, that is, without any enlargement and completely free of abnormal areas or masses.

In table 1 the strains are arranged according to their degree of susceptibility to the induced growths. Strain C animals were the most susceptible, since most of them developed pronounced liver changes and none had a liver which appeared normal. Furthermore, 8 of the strain C mice died or were sacrificed because of ill health before receiving the entire series of injections.

Mice of strains A and I were next in order of susceptibility. The results suggest that the strain A animals were more susceptible than the strain I males but less susceptible than the strain I females. The 1 strain A animal which did not reveal any liver change died 37 weeks after the beginning of the experiment, while all 3 of the negative strain I males lived throughout the experiment. It is of interest to note that the strain I females developed more pronounced liver changes than did the strain I males, but the number of experimental animals is too small to justify definite conclusions.

The strain C_3H mice were less susceptible than those of strain A or the strain I females but were, apparently, more susceptible than the strain I males. All the C_3H animals lived throughout the experiment and only 1 developed a pronounced liver reaction.

The Y mice were more resistant than the other 3 strains. This is made evident by the fact that 8 died with macroscopically normal livers and none developed pronounced liver lesions.

Attention is directed to the small number of animals used as representatives of the various strains. Because of the small number, it is believed that generalizations should not be made on the basis of the results obtained, but there is good evidence that livers of mice of strain C are the most susceptible and those of mice of strain Y the most resistant to the carcinogenic activity of the compound. It is also believed that the results permit the conclusion that susceptibility to liver growths induced by 2-amino-5-azotoluene is not correlated

with susceptibility to spontaneous hepatoma, for, as mentioned previously in this report, the C_3H mice, especially males, are the strain most susceptible to spontaneous growths, but both the C and A strain animals were more susceptible to the induced liver growths. This may be of some significance, for it has been shown (*3*) that 2-amino-5-azotoluene induces lung tumors in mice of strains A and C, which are also the most susceptible to spontaneous pulmonary tumors.

A number of liver masses were dissected out and a piece implanted subcutaneously in the right axillary region of one or two mice of the same strain as the animal from which the mass was taken. A portion of every mass used for transplantation was fixed and stained for histologic study.

As shown in table 2, of 28 liver masses implanted into the subcutaneous tissues of normal mice, 7 showed evidence of growth within 7 months after inoculation. Of the 3 successful implants from strain C mice, 1 is still in the first transplant generation, and the other 2 have grown through 2 serial passages. Of the 4 growths obtained from strain I livers, 2 have undergone 2 serial passages and the remaining 2 are still in the second passage generation. Three masses from strain A livers failed to grow within 20 weeks after transplantation, when the inoculated animals were sacrificed.

TABLE 2.—*Summary of transplantation of liver masses arising in mice of strains C, I, and C_3H, following subcutaneous injections of 2-amino-5-azotoluene* [1]

Strain	Number of masses transplanted	Results	
		Number growing	Number showing no growth up to May 26, 1939
C	8	3	5
I	16	4	12
C_3H	4	0	4

[1] All inoculations made on Oct. 26, 1938.

Transplants from the primary liver growths as well as further serial passages have grown very slowly in the subcutaneous tissues of inoculated mice, and up to the present time successful growth has not occurred in all mice of the serial passage generations. This phase of the experiment is receiving further consideration.

SUMMARY

Mice of strains A, C, C_3H, I, and Y were injected subcutaneously with 10 mg. of commercial 2-amino-5-azotoluene each month for 11 months. According to the macroscopic appearance of the livers, mice of strain C were the most susceptible and mice of strain Y the most resistant to the action of the compound.

Mice of strain A were more susceptible than those of strain C_3H. Since strain C_3H animals are more susceptible to spontaneous hepatoma than those of strain A, the results suggest that in these strains susceptibility to liver growths induced by 2-amino-5-azotoluene is not correlated with susceptibility to spontaneous hepatoma.

REFERENCES

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COURT DECISION ON PUBLIC HEALTH

City ordinance regarding collection and removal of garbage upheld.—(Ohio Court of Appeals; *City of Canton* v. *Van Voorhis*, 22 N.E.2d 651; decided February 1, 1939.) Sections 60 and 61 of the revised ordinances of 1930 of the city of Canton provided:

No person other than the duly authorized employees of the city of Canton shall collect, remove, appropriate, convey, or transport any garbage which has heretofore been placed or put in such garbage can.

No person shall collect, remove, convey, or transport any garbage by any means whatsoever in, over, or upon any street or public highway in the city of Canton.

Under the State constitution cities had authority to exercise all powers of local self government and to adopt and enforce within their limits such local police, sanitary, and other similar regulations as were not in conflict with general laws. The only statute delegating power to cities concerning the collection and disposition of garbage was section 3649, General Code, which read as follows:

To provide for the collection and disposition of sewage, garbage, ashes, animal and vegetable refuse, dead animals and animal offal and to establish, maintain, and regulate plants for the disposal thereof.

On appeal by one found guilty of collecting and removing garbage in violation of the Canton ordinance, the court of appeals said that it was of the opinion that the ordinance in question did not conflict with the above quoted general law, but that on the other hand the ordinance was in compliance with that section. In affirming the judgment of the lower court the appellate court further stated:

It is quite clear to this court that the hauling of garbage over city streets is not an ordinary and customary street use, but rather a special use which the city of Canton has a legal right to entirely prohibit if it so feels inclined.

The courts of this country have been uniform in holding that ordinances passed for the collection and disposition of garbage, based upon reasonable grounds as a means for the protection of the public health, are not a taking of private property for public use without compensation within the meaning of the Federal constitution, even though such garbage and refuse may have some elements of value for certain purposes. [Case cited.]

"Property rights of individuals must be subordinated to the general good and if the owner of garbage suffers any loss by its destruction he is compensated therefor in the common benefit secured by the regulation requiring all garbage to be destroyed." [Case cited.]

The Supreme Court of Ohio, in the case of *State ex rel. Moock* v. *City of Cincinnati*, 120 Ohio St. 500, 166 N.E. 583, held: "The adoption of regulations pertaining to health and sanitation, including the process of collection and disposal of garbage, is within the proper exercise of the police powers of the State and of its municipalities."

DEATHS DURING WEEK ENDED OCTOBER 14, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 14, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,596	7,982
Average for 3 prior years	[1] 7,856	
Total deaths, first 41 weeks of year	339,054	332,731
Deaths under 1 year of age	486	516
Average for 3 prior years	[1] 536	
Deaths under 1 year of age, first 41 weeks of year	20,551	21,631
Data from industrial insurance companies:		
Policies in force	66,584,285	68,266,941
Number of death claims	8,774	9,505
Death claims per 1,000 policies in force, annual rate	6.9	7.3
Death claims per 1,000 policies, first 41 weeks of year, annual rate	10.0	9.8

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders ( ) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 21, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	5	3	6	1	------	------	6	1	31	18
New Hampshire	0	0	0	0	------	------	------	------	51	5	0	1
Vermont	0	0	0	0	------	------	------	------	94	7	3	3
Massachusetts	8	7	3	3	------	------	------	------	83	71	71	38
Rhode Island	0	0	1	1	------	------	------	------	221	29	0	1
Connecticut	0	0	2	2	------	------	4	2	18	6	23	23
MID. ATL.												
New York	7	17	19	24	[1] 8	[1] 11	[1] 6	[1] 10	54	135	66	91
New Jersey	5	4	4	13	6	5	4	9	10	8	14	19
Pennsylvania	8	15	31	31	------	------	------	------	9	18	135	135
E. NO. CEN.												
Ohio	25	33	61	61	1	1	------	4	7	9	11	31
Indiana	34	23	23	40	9	6	14	17	4	3	10	5
Illinois	18	27	30	38	1	2	8	10	7	11	13	15
Michigan [2, 3]	5	5	27	13	------	------	------	------	0	0	39	36
Wisconsin	4	2	1	6	26	15	37	30	35	20	92	40
W. NO. CEN.												
Minnesota	8	4	14	14	2	1	1	1	16	8	54	10
Iowa	4	2	23	8	------	------	2	------	16	8	13	3
Missouri	14	11	26	41	------	------	10	27	5	4	7	9
North Dakota	0	0	1	2	15	2	10	------	7	1	116	9
South Dakota	8	1	0	1	------	------	------	------	210	28	18	7
Nebraska	4	1	5	6	------	------	1	------	4	1	2	2
Kansas	22	8	10	10	25	9	4	------	92	33	1	2

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 21, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	1	1	------	------	------	------	0	0	0	0
Maryland [2]	25	8	9	16	22	7	6	10	3	1	16	10
Dist. of Col.	65	8	1	6	------	------	------	------	8	1	0	2
Virginia [4]	150	80	150	77	62	83	110	------	11	6	4	9
West Virginia	48	18	29	47	40	15	15	15	8	3	2	5
North Carolina [3][4]	209	143	148	122	7	5	4	4	136	93	86	10
South Carolina [4]	87	32	34	25	571	209	256	169	0	0	6	3
Georgia [4]	88	53	59	54	56	34	34	------	0	0	3	0
Florida	9	3	11	13	6	2	4	2	57	19	5	2
E. SO. CEN.												
Kentucky	19	11	49	49	5	3	14	10	3	2	1	35
Tennessee [4]	71	40	60	67	39	22	53	19	21	12	11	8
Alabama [4]	72	41	48	43	72	41	38	25	0	0	4	4
Mississippi [2][4]	61	24	30	25	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	72	29	26	19	45	18	39	13	5	2	1	1
Louisiana [4]	68	28	30	26	2	1	3	6	2	1	65	3
Oklahoma	18	9	14	14	52	26	36	36	4	2	1	2
Texas [4]	23	28	48	48	116	140	78	123	31	38	4	4
MOUNTAIN												
Montana	122	13	1	1	140	15	19	1	122	13	98	27
Idaho	0	0	0	0	------	------	5	1	0	0	33	19
Wyoming	22	1	1	1	------	------	1	------	2, 138	98	1	1
Colorado	43	9	8	10	43	9	17	------	91	19	1	3
New Mexico	37	3	12	8	25	2	1	1	25	2	9	21
Arizona	37	3	5	5	650	53	54	84	0	0	3	1
Utah [2]	0	0	1	0	70	7	1	------	40	4	6	5
PACIFIC												
Washington	6	2	2	1	------	------	------	------	740	240	18	18
Oregon	5	1	1	1	20	4	5	15	85	17	5	5
California [4]	18	22	37	42	15	18	15	15	86	105	211	116
Total	31	769	1, 101	1, 101	34	717	909	654	44	1, 084	1, 313	1, 313
42 weeks	16	17, 053	21, 434	21, 434	175	156, 030	51, 626	108, 230	340	353, 771	767, 804	676, 125

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	1	0	0	0	0	1	48	8	16	15
New Hampshire	0	0	0	0	0	0	0	1	61	6	2	2
Vermont	0	0	0	0	0	0	0	0	40	3	4	5
Massachusetts	1. 2	1	1	1	5	4	1	2	64	54	72	106
Rhode Island	8	1	0	0	0	0	0	0	15	2	7	14
Connecticut	0	0	1	0	3	1	0	1	42	14	23	24
MID. ATL.												
New York	0	0	8	8	25	63	5	14	47	117	187	206
New Jersey	0	0	0	0	11	9	1	1	63	53	39	51
Pennsylvania	3	6	2	8	14	28	0	6	91	179	208	230

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 21, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934-38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934-38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934-38, median
E. NO. CEN.												
Ohio	0.8	1	3	7	5	6	0	3	134	174	224	224
Indiana	1.5	1	1	1	6	4	1	3	153	103	120	120
Illinois	2.6	4	3	3	3	5	2	10	102	156	224	224
Michigan [2, 3]	1.1	1	2	1	39	37	1	12	174	165	287	184
Wisconsin	0	0	3	1	12	7	0	3	158	90	130	130
W. NO. CEN.												
Minnesota	0	0	0	0	39	20	1	3	124	64	53	53
Iowa	2	1	0	0	24	12	1	7	105	52	59	66
Missouri	0	0	1	2	1.3	1	0	1	72	56	67	76
North Dakota	0	0	0	1	7	1	0	1	102	14	26	19
South Dakota	0	0	0	0	8	1	1	0	180	24	31	21
Nebraska	0	0	0	0	8	2	1	1	31	8	23	23
Kansas	2.8	1	0	0	6	2	0	1	210	75	85	80
SO. ATL.												
Delaware	0	0	0	0	20	1	0	0	98	5	10	6
Maryland [2]	0	0	1	2	6	2	2	2	126	41	28	44
District of Columbia	0	0	0	0	8	1	1	1	97	12	13	13
Virginia [4]	0	0	5	4	4	2	5	2	82	44	38	42
West Virginia	5	2	1	1	8	3	0	1	274	102	86	86
North Carolina [3, 4]	1.5	1	2	2	13	9	0	2	123	84	100	95
South Carolina [4]	0	0	1	1	0	0	0	1	36	13	15	14
Georgia [4]	0	0	0	0	1.7	1	2	2	58	35	28	25
Florida	9	3	0	0	3	1	1	0	33	11	8	3
E. SO. CEN.												
Kentucky	1.7	1	2	2	43	25	0	4	90	52	94	85
Tennessee [4]	0	0	1	1	1.8	1	0	3	109	62	47	65
Alabama [4]	12	7	0	1	1.8	1	2	1	93	53	31	31
Mississippi [3, 4]	0	0	1	1	0	0	0	1	25	10	18	18
W. SO. CEN.												
Arkansas	0	0	0	0	7	3	0	2	42	17	23	12
Louisiana [4]	0	0	2	1	0	0	0	1	19	8	8	9
Oklahoma	0	0	1	1	4	2	0	0	40	20	31	11
Texas [4]	0.8	1	2	2	9	11	0	3	22	27	45	45
MOUNTAIN												
Montana	0	0	0	0	0	0	0	3	262	28	19	19
Idaho	0	0	0	0	10	1	0	1	92	9	17	21
Wyoming	0	0	0	0	0	0	0	0	87	4	7	10
Colorado	0	0	0	2	58	12	0	1	144	30	27	27
New Mexico	0	0	0	0	111	9	1	1	99	8	27	16
Arizona	12	1	0	0	12	1	0	0	61	5	6	7
Utah [2]	0	0	0	0	50	5	2	1	169	17	5	25
PACIFIC												
Washington	3	1	0	0	6	2	3	3	89	29	20	39
Oregon	0	0	0	0	20	4	0	4	65	13	22	22
California [4]	1.6	2	0	3	28	34	2	17	99	121	156	156
Total	1.5	37	45	67	13	334	36	242	91	2,277	2,816	2,896
42 weeks	1.5	1,626	2,450	4,672	6	6,008	1,480	6,487	122	128,555	151,570	180,486

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 21, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934–38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases
NEW ENG.											
Maine	0	0	0	0	24	4	2	2	290	48	70
New Hampshire	0	0	0	0	0	0	1	1	0	0	10
Vermont	0	0	0	0	0	0	0	0	550	41	105
Massachusetts	0	0	0	0	1	1	2	4	89	76	109
Rhode Island	0	0	0	0	31	4	1	0	145	19	33
Connecticut	0	0	0	0	6	2	0	1	163	55	96
MID. ATL.											
New York	0	0	0	0	4	11	22	22	87	217	504
New Jersey	0	0	0	0	4	3	2	3	90	76	231
Pennsylvania	0	0	0	0	4	7	68	42	151	297	215
E. NO. CEN.											
Ohio	1	1	0	0	12	15	12	17	61	80	70
Indiana	12	8	4	1	6	4	3	6	55	37	46
Illinois	1	1	1	1	17	26	9	11	98	149	508
Michigan [2] [3]	1	1	2	0	7	7	3	10	90	85	228
Wisconsin	2	1	0	1	0	0	1	3	192	109	314
W. NO. CEN.											
Minnesota	2	1	4	4	0	0	2	2	83	43	35
Iowa	2	1	0	2	6	3	1	7	26	13	12
Missouri	1	1	6	6	19	15	5	11	19	15	17
North Dakota	0	0	0	0	0	0	2	1	22	3	21
South Dakota	0	0	1	1	0	0	0	1	23	3	7
Nebraska	4	1	0	1	0	0	0	1	27	7	14
Kansas	0	0	0	0	8	3	2	2	8	3	26
SO. ATL.											
Delaware	0	0	0	0	79	4	2	1	59	3	2
Maryland [3]	0	0	0	0	19	6	19	11	114	37	12
District of Columbia	0	0	0	0	8	1	0	0	57	7	7
Virginia [4]	0	0	0	0	19	10	24	24	96	51	10
West Virginia	0	0	0	0	19	7	7	12	94	35	7
North Carolina [3] [4]	0	0	0	0	7	5	8	9	98	67	108
South Carolina [4]	0	0	0	0	22	8	3	6	33	12	43
Georgia [4]	0	0	0	0	10	6	10	10	30	18	22
Florida	0	0	0	0	6	2	4	2	9	3	35
E. SO. CEN.											
Kentucky	0	0	0	0	19	11	12	19	45	26	8
Tennessee [4]	0	0	0	0	25	14	21	19	81	46	33
Alabama [4]	0	0	1	0	4	2	5	5	25	14	7
Mississippi [2] [4]	0	0	1	0	5	2	7	7	-------	-------	-------
W. SO. CEN.											
Arkansas	5	2	1	0	22	9	17	7	72	29	4
Louisiana [4]	0	0	0	0	29	12	19	14	19	8	17
Oklahoma	2	1	2	0	10	5	12	13	0	0	2
Texas [4]	0	0	1	1	22	27	21	31	22	27	60
MOUNTAIN											
Montana	0	0	14	3	9	1	11	3	75	8	22
Idaho	0	0	0	1	20	2	3	3	0	0	1
Wyoming	44	2	0	0	0	0	2	0	22	1	3
Colorado	5	1	4	1	10	2	10	3	39	8	25
New Mexico	0	0	0	0	74	6	15	18	284	23	8
Arizona	0	0	0	0	37	3	3	4	110	9	11
Utah [2]	0	0	0	0	0	0	0	0	477	48	18

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 21, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934-38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases	1934-38, median	Oct. 21, 1939, rate	Oct. 21, 1939, cases	Oct. 22, 1938, cases
PACIFIC											
Washington	3	1	0	4	19	6	1	4	31	10	24
Oregon	0	0	6	0	35	7	0	2	55	11	2
California [4]	4	5	3	2	12	15	5	10	91	111	152
Total	1	28	51	78	11	278	379	412	80	1,988	3,314
42 weeks	8	8,885	13,060	6,387	10	11,003	12,340	12,966	142	147,861	173,038

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended Oct. 21, 1939, 2 cases as follows: Michigan, 1; North Carolina, 1.
[4] Typhus fever, week ended Oct. 21, 1939, 59 cases as follows: Virginia, 1; North Carolina, 3; South Carolina, 10; Georgia, 19; Tennessee, 4; Alabama, 9; Mississippi, 8; Louisiana, 3; Texas, 5; California, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
September 1939										
Alabama	183	77	1,698	10	2	32	3	128	1	85
Colorado	36	41		23	2		48	70	18	32
District of Columbia	22	2		3	1		9	17	0	7
Idaho	2			14	0		2	6	0	10
Illinois	60	20	53	52	4	1	62	295	8	412
Indiana	67	24	9	19	0		12	204	5	54
Kentucky	60	9	17	39	6	1	26	146	0	108
Louisiana	50	12	50	2	3	5	1	24	0	58
Maryland	13	7		13	1	2	7	87	0	18
Michigan	18	12	7	66	4		251	320	0	23
Minnesota	17	7	2	34	1		204	135	2	9
Mississippi	95	1,595	7,053	84	2	314	3	46	1	24
Nebraska	9			4	1		9	45	4	2
New Mexico	10	1	4	1	2		35	26	0	16
New York	24		11	175	10		456	211	0	77
Ohio	70	25	8	45	7		46	318		96
Oklahoma	33	35	377	10	2	10	10	37	11	93
Vermont	0			21	0		14	12	0	2

Summary of monthly reports from States—Continued

September 1939

	Cases
Actinomycosis:	
Michigan	1
Anthrax:	
New York	1
Botulism:	
Idaho	1
Chickenpox:	
Alabama	7
Colorado	22
District of Columbia	2
Idaho	8
Illinois	157
Indiana	25
Kentucky	16
Louisiana	5
Maryland	18
Michigan	121
Minnesota	44
Mississippi	85
Nebraska	12
New Mexico	5
New York	191
Ohio	117
Oklahoma	6
Vermont	36
Dengue:	
Mississippi	3
Diarrhea:	
Maryland	40
Michigan (infant)	2
New Mexico	21
Ohio (under 2 years; enteritis included)	191
Dysentery:	
Colorado (amoebic)	1
Colorado (bacillary)	31
District of Columbia (amoebic)	1
Illinois (amoebic)	11
Illinois (amoebic carriers)	21
Illinois (bacillary)	47
Indiana (amoebic)	1
Indiana (bacillary)	72
Kentucky (amoebic)	1
Kentucky (bacillary)	45
Louisiana (amoebic)	3
Louisiana (bacillary)	2
Maryland (amoebic)	2
Maryland (bacillary)	34
Maryland (unspecified)	11
Michigan (amoebic)	3
Michigan (bacillary)	21
Michigan (unspecified)	3
Minnesota (amoebic)	1
Mississippi (amoebic)	163
Mississippi (bacillary)	492
New Mexico (amoebic)	4
New Mexico (bacillary)	18
New Mexico (unspecified)	10
New York (amoebic)	10
New York (bacillary)	682
Ohio (amoebic)	1
Ohio (bacillary)	13
Oklahoma (amoebic)	2
Oklahoma (bacillary)	39
Encephalitis, epidemic or lethargic:	
Alabama	3
Colorado	7
Illinois	4
Indiana	8
Michigan	1
Nebraska	2
New York	14
Ohio	5
Oklahoma	2

	Cases
Food poisoning:	
Illinois	7
New Mexico	1
German measles:	
Alabama	1
Idaho	5
Illinois	16
Maryland	5
Michigan	23
New Mexico	3
New York	89
Ohio	6
Hookworm disease:	
Louisiana	12
Mississippi	637
Impetigo contagiosa:	
Illinois	54
Maryland	43
Ohio	72
Oklahoma	15
Lead poisoning:	
Ohio	9
Leprosy:	
Louisiana	1
Mumps:	
Alabama	10
Colorado	19
Idaho	1
Illinois	76
Indiana	35
Kentucky	38
Louisiana	7
Maryland	21
Mississippi	111
Nebraska	12
New Mexico	11
Ohio	116
Oklahoma	14
Vermont	17
Ophthalmia neonatorum:	
Illinois	2
Mississippi	4
New York	10
Puerperal septicemia:	
Mississippi	40
Ohio	5
Rabies in animals:	
Alabama	15
Illinois	14
Indiana	46
Louisiana	9
Mississippi	10
New Mexico	6
New York [1]	10
Oklahoma	1
Vermont	1
Rabies in man:	
Alabama	1
Louisiana	1
Rocky Mountain spotted fever:	
Indiana	3
Kentucky	2
Maryland	2
Mississippi (August)	1
New York	2
Scabies: Oklahoma	2
Septic sore throat:	
Colorado	6
Idaho	1
Illinois	4
Kentucky	17
Louisiana	2
Maryland	14
Michigan	33
Minnesota	12
New Mexico	4
New York	158

	Cases
Septic sore throat—Con.	
Ohio	4
Oklahoma	42
Tetanus:	
Alabama	4
Illinois	10
Indiana	2
Louisiana	4
Maryland	3
Michigan	7
New York	14
Ohio	2
Oklahoma	1
Trachoma:	
Illinois	27
Indiana	9
Michigan	1
Mississippi	5
New Mexico	1
Ohio	13
Oklahoma	110
Trichinosis:	
Michigan	2
New York	6
Tularaemia:	
Alabama	1
District of Columbia	1
Illinois	5
Indiana	2
Kentucky	3
Louisiana	3
Minnesota	2
Typhus fever:	
Alabama	62
Louisiana	28
Mississippi	4
New York	4
Undulant fever:	
Alabama	6
Illinois	23
Indiana	3
Kentucky	4
Louisiana	6
Maryland	5
Michigan	11
Minnesota	7
Mississippi	3
Nebraska	1
New Mexico	1
New York	41
Ohio	10
Oklahoma	60
Vermont	2
Vincent's infection:	
Idaho	1
Illinois	19
Maryland	9
Michigan	9
New York [1]	59
Oklahoma	9
Whooping cough:	
Alabama	117
Colorado	89
District of Columbia	92
Idaho	6
Illinois	919
Indiana	260
Kentucky	188
Louisiana	71
Maryland	187
Michigan	579
Minnesota	320
Mississippi	373
Nebraska	18
New Mexico	108
New York	1,343
Ohio	620
Oklahoma	31
Vermont	121

[1] Exclusive of New York City.

PLAGUE INFECTION IN CALIFORNIA

IN FLEAS FROM GROUND SQUIRRELS IN ELDORADO COUNTY

Under date of October 16, 1939, Dr. W. M. Dickie, State Director of Public Health of California, reported plague infection proved, by animal inoculation, in a pool of 15 fleas from 13 golden mantled squirrels submitted to the laboratory on September 30 from property located at the west end of Emerald Bay, Eldorado County, Calif.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 14, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	192	82	24	217	422	701	4	340	60	910	--------
Current week [1]	108	40	10	231	264	429	0	294	36	719	--------
Maine:											
Portland	0	------	0	2	1	0	0	1	0	7	22
New Hampshire:											
Concord	0	------	0	1	1	0	0	0	0	0	14
Nashua	0	------	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	0	0	0	0	0	0	3	9
Rutland	0	------	0	0	0	0	0	0	0	0	1
Massachusetts:											
Boston	1	------	1	10	14	8	0	8	0	19	207
Fall River	1	------	0	0	0	0	0	2	1	1	31
Springfield	0	------	0	0	0	1	0	0	0	6	33
Worcester	0	------	0	0	0	1	0	1	0	4	40
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	17
Providence	0	------	0	7	0	2	0	3	0	5	53
Connecticut:											
Bridgeport	0	------	0	0	4	2	0	1	0	0	44
Hartford	0	------	0	0	1	0	0	3	0	29	30
New Haven	0	------	0	6	0	1	0	1	0	2	48
New York:											
Buffalo	0	------	0	4	2	4	0	2	0	4	103
New York	9	2	1	12	46	29	0	74	8	79	1,395
Rochester	0	1	0	1	0	0	0	2	1	1	48
Syracuse	0	------	0	0	2	4	0	0	0	14	53
New Jersey:											
Camden	0	------	0	0	1	6	0	1	0	0	25
Newark	0	1	0	4	3	11	0	3	0	21	91
Trenton	0	------	0	0	1	1	0	0	0	2	26
Pennsylvania:											
Philadelphia	2	1	1	5	14	14	0	17	1	60	413
Pittsburgh	3	1	2	3	15	21	0	10	0	10	183
Reading	0	------	0	0	3	0	0	2	0	0	27
Scranton	0	------	--------	0	-------	1	0	-------	0	4	--------
Ohio:											
Cincinnati	6	------	0	0	7	12	0	7	0	4	134
Cleveland	0	8	0	2	12	14	0	9	2	62	178
Columbus	11	------	0	0	1	5	0	1	0	1	70
Toledo	0	1	1	8	3	10	0	3	1	17	70
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	9
Fort Wayne	0	------	0	0	1	3	0	0	0	2	25
Indianapolis	1	------	0	3	4	12	0	4	0	18	90
Muncie	0	------	0	0	0	1	0	0	0	0	9
South Bend	0	------	0	0	2	0	0	0	0	2	19
Terre Haute	0	------	0	1	2	3	0	6	0	0	16

[1] Figures for Salt Lake City estimated; report not received.

City reports for week ended October 14, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Illinois:											
Alton	0		0	0	0	0	0	0	0	0	10
Chicago	12	1	1	7	26	47	0	18	3	49	614
Elgin	0		0	0	0	3	0	0	0	1	13
Moline	0		0	0	0	1	0	0	0	2	9
Springfield	0		1	1	0	0	0	0	0	4	18
Michigan											
Detroit	4	1	0	6	7	38	0	16	0	52	240
Flint	0		0	1	2	3	0	1	0	4	26
Grand Rapids	0		0	1	1	2	0	0	1	2	26
Wisconsin:											
Kenosha	0		0	0	0	3	0	0	0	1	5
Madison	0		0	0	1	0	0	0	0	9	21
Milwaukee	0		0	0	2	19	0	6	0	11	112
Racine	0		0	1	0	6	0	0	0	2	8
Superior	0		0	0	0	0	0	0	0	2	5
Minnesota:											
Duluth	0		0	1	2	0	0	0	0	2	26
Minneapolis	3		0	4	3	19	0	1	0	14	105
St. Paul	0		0	0	5	0	0	2	0	20	64
Iowa											
Cedar Rapids	0			1		0	0		0	3	
Davenport	0			0		4	0		0	0	
Des Moines	0		0	1	0	14	0	0	0	0	29
Sioux City	0			0		0	0		0	0	
Waterloo	1			1		1	0		0	0	
Missouri											
Kansas City	2		0	1	3	10	0	5	0	1	80
St. Joseph	0		0	1	1	2	0	0	0	0	23
St. Louis	1		0	2	2	11	0	4	2	13	174
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	6	7
Grand Forks	0			0		1	0		0	0	
Minot	0		0	0	0	0	0	0	0	0	5
South Dakota:											
Aberdeen	0			0		1	0		0	0	
Sioux Falls	0		0	0	0	3	0	0	0	0	7
Nebraska:											
Lincoln	0			0		1	0		0	1	
Omaha	1		0	0	3	1	0	4	1	1	45
Kansas											
Lawrence	0	1	0	0	0	0	0	0	0	0	1
Topeka	0		0	0	0	1	0	0	0	0	2
Wichita	0		0	4	1	1	0	0	0	2	32
Delaware:											
Wilmington	0		0	0	0	0	0	0	0	1	24
Maryland:											
Baltimore	1	7	0	1	5	8	0	8	0	21	187
Cumberland	3		0	1	0	6	0	0	0	0	13
Frederick	0		0	0	0	0	0	0	0	0	2
Dist. of Col.:											
Washington	9		0	0	5	4	0	8	2	26	167
Virginia											
Lynchburg	6		0	0	0	0	0	0	0	6	7
Norfolk	1		0	1	1	2	0	1	0	0	31
Richmond	0		0	0	4	1	0	2	1	0	45
Roanoke	0		0	0	0	1	0	0	0	0	18
West Virginia:											
Charleston	2		0	0	1	2	0	0	0	0	20
Huntington	3			1		0	0		0	0	
Wheeling	0		0	1	1	1	0	1	1	11	22
North Carolina:											
Gastonia	1			0		0	1		0	0	
Raleigh	2		0	0	1	0	0	0	0	0	10
Wilmington	0		0	0	1	0	0	0	0	1	15
Winston-Salem	0		0	1	0	1	0	0	0	0	12
South Carolina:											
Charleston	0	5	0	0	2	0	0	0	1	0	23
Florence	3	19	0	0	0	0	0	1	1	0	6
Greenville	1		0	0	0	0	0	0	0	0	5
Georgia:											
Atlanta	1	6	0	1	3	21	0	6	0	0	77
Brunswick	0		0	0	1	0	0	0	0	6	4
Savannah	3		0	0	1	6	0	1	0	0	40
Florida:											
Miami	0		0	1	0	1	0	3	0	0	30
Tampa	0	1	1	0	3	0	0	1	0	0	22

City reports for week ended October 14, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Kentucky:											
Ashland	0	------	0	0	0	1	0	0	0	0	4
Covington	0	------	0	0	0	6	0	1	0	0	11
Lexington	0	------	0	0	0	3	0	2	0	2	15
Tennessee:											
Knoxville	8	------	0	0	0	1	0	0	0	0	20
Memphis	0	------	0	1	1	7	0	4	1	14	80
Nashville	0	------	0	2	2	2	0	1	1	9	45
Alabama:											
Birmingham	1	1	0	1	1	3	0	4	0	0	68
Mobile	0	------	0	0	0	1	0	1	0	0	24
Montgomery	1	------	------	0	------	3	0	------	0	0	------
Arkansas:											
Fort Smith	1	------	------	0	------	0	0	------	0	0	------
Little Rock	1	1	0	0	2	0	0	1	0	0	------
Louisiana:											
Lake Charles	2	------	0	0	0	0	0	0	0	0	5
New Orleans	5	1	1	0	9	0	0	6	2	46	123
Shreveport	0	------	0	0	3	2	0	2	0	0	30
Oklahoma:											
Oklahoma City	1	3	------	0	2	1	1	0	0	0	38
Tulsa	0	------	------	1	------	0	1	------	0	0	------
Texas:											
Dallas	1	------	0	0	0	0	0	3	2	0	55
Fort Worth	0	------	0	0	3	1	0	2	1	2	37
Galveston	0	------	0	0	0	0	0	0	0	0	12
Houston	4	------	0	0	5	3	0	7	0	0	69
San Antonio	1	------	0	0	1	1	0	4	1	0	49
Montana:											
Billings	0	------	0	0	0	2	0	0	1	0	6
Great Falls	0	------	0	0	0	1	0	0	0	0	7
Helena	0	------	0	0	0	0	0	0	0	2	1
Missoula	0	------	0	0	0	0	0	0	0	0	2
Idaho:											
Boise	0	------	0	0	2	0	0	0	0	0	6
Colorado:											
Colorado Springs	0	------	0	0	1	1	0	0	0	1	8
Denver	2	------	1	4	4	4	0	1	1	8	78
Pueblo	4	------	0	0	1	3	0	1	0	0	10
Utah:											
Salt Lake City	------	------	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	0	------	0	7	1	3	0	4	0	0	71
Spokane	0	------	0	3	2	4	0	0	1	0	29
Tacoma	0	------	0	110	1	1	0	0	0	0	22
Oregon:											
Portland	0	------	0	4	0	7	0	1	0	3	77
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	4	2	0	5	2	20	0	12	0	13	258
Sacramento	1	------	0	0	0	1	0	0	0	0	23
San Francisco	0	------	0	2	4	2	0	7	1	5	140

City reports for week ended October 14, 1939—Continued

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
Vermont:			
Burlington	0	0	3
Massachusetts:			
Fall River	0	0	1
Worcester	0	0	1
Connecticut:			
Bridgeport	0	1	2
New Haven	0	0	1
New York:			
Buffalo	0	0	16
New York	1	1	10
Rochester	0	0	4
New Jersey:			
Trenton	0	0	2
Pennsylvania:			
Philadelphia	0	0	10
Pittsburgh	2	0	8
Scranton	0	0	2
Ohio:			
Cincinnati	0	0	1
Indiana:			
Indianapolis	0	0	1
Illinois:			
Chicago	0	1	5
Michigan:			
Detroit	0	0	18
Flint	0	0	1
Grand Rapids	0	0	1
Minnesota:			
Duluth	0	0	2
Minneapolis	0	0	15
St. Paul	0	0	3
Iowa:			
Davenport	0	0	1
Des Moines	0	0	4
South Dakota:			
Aberdeen	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	1
Maryland:			
Baltimore	0	0	2
West Virginia:			
Wheeling	1	0	0
Texas:			
Dallas	0	0	1
Fort Worth	0	0	2
Colorado:			
Pueblo	0	0	3
California:			
Los Angeles	0	0	7

Encephalitis, epidemic or lethargic.—Cases: New York, 2; Trenton, 1; Kansas City, Mo., 2; St. Louis, 2; Wichita, 2; Mobile, 1.

Pellagra.—Cases: Baltimore, 1; Charleston, S. C., 1; Florence, 4; Atlanta, 1; Los Angeles, 2.

Typhus fever.—Cases: Charleston, S. C., 1; Atlanta, 4; Savannah, 2; Tampa, 1; Nashville, 15; Mobile, 1; Montgomery, 2; New Orleans, 1; Dallas, 1; Fort Worth, 1; Houston, 1; Los Angeles, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended September 23 and 30, 1939.—During the weeks ended September 23 and 30, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended Sept. 23, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1		2				1	4
Chickenpox				21	27	3	38	8	20	117
Diphtheria				38	3	2	11	3		57
Dysentery				10	1					11
Influenza		2			6				3	11
Measles		2		33	17	20		2	4	78
Mumps				7	26	4	2	2	5	46
Pneumonia		2			2		1		4	9
Poliomyelitis		1		8	17	2		5		33
Scarlet fever	10	5	5	79	59	15	17	12	9	211
Tuberculosis	1	27	14	116	51			1		210
Typhoid and paratyphoid fever			3	27	5		9	4	1	49
Whooping cough		36	7	113	75	30	37	2	7	307

Week ended Sept. 30, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1			1					2
Chickenpox		6		64	59	13	18	21	32	213
Diphtheria		1	5	57		12	15	2		92
Dysentery				6	1					7
Influenza		13			2				5	20
Lethargic encephalitis							1			1
Measles		1		16	20	9		1	28	75
Mumps				13	23	4	1	1	11	53
Pneumonia		1			8		1		4	14
Poliomyelitis				9	16	2				27
Scarlet fever		7	5	72	79	9	12	8	11	203
Tuberculosis	3	4	8	107	48	3	30			203
Typhoid and paratyphoid fever			3	23	5	5	1		2	39
Whooping cough		17		56	80	33	26	13	13	238

JAMAICA

Communicable diseases—4 weeks ended September 30, 1939.—During the 4 weeks ended September 30, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1		Puerperal sepsis		2
Chickenpox	5	4	Scarlet fever	1	
Diphtheria	3		Tuberculosis	29	77
Dysentery	1	2	Typhoid fever	11	112
Erysipelas		2			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of October 27, 1939, pages 1950–1963. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Sector.—A rat found on September 25, 1939, in Hamakua Mill Sector, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

United States—California—Eldorado County.—A report of plague infection in Eldorado County, Calif., appears on page 1999 of this issue of PUBLIC HEALTH REPORTS.

Smallpox

Colombia—Cartagena.—During the week ended October 7, 1939, 3 cases of smallpox were reported in Cartagena, Colombia.

Mexico.—During the month of July 1939, smallpox was reported in Mexico as follows: Mexico, D. F., 5 cases; Saltillo, Coahuila State, 7 cases; San Luis Potosi, San Luis Potosi State, 9 cases, 1 death.

Typhus Fever

Mexico.—For the month of July 1939, typhus fever was reported in Mexico as follows: Mexico, D. F., 31 cases, 5 deaths; Monterrey, Nuevo Leon State, 5 cases; Queretaro, Queretaro State, 1 case, 1 death; San Luis Potosi, San Luis Potosi State, 5 cases, 1 death.

Yellow Fever

Colombia—Antioquia Department—San Carlos.—For the week ended October 14, 1939, 1 death from yellow fever was reported in San Carlos, Antioquia Department, Colombia.

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Public Health Reports

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IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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STUDIES ON OXYURIASIS

XIV. CONTROLLED TESTS WITH VARIOUS METHODS OF THERAPY

By WILLARD H. WRIGHT, *Chief*, FREDERICK J. BRADY, *Passed Assistant Surgeon*, and JOHN BOZICEVICH, *Associate Zoologist, Division of Zoology, National Institute of Health, United States Public Health Service*

This paper represents a further report of the results of experiments designed to develop a satisfactory treatment for oxyuriasis and includes observations on the use of santonin, various preparations of hexylresorcinol, anal ointments, and nonmedicated enemas. The second and fourth papers in this series presented the results of tetrachlorethylene treatment and the eighth paper presented a preliminary report on the use of gentian violet. [1]

The difficulty of eradicating pinworm infection is reflected by the many methods recommended in the literature for the treatment of this condition. However, in our experiments we have endeavored to select for test only those drugs and methods of therapy which seemed most promising from the standpoint of the life cycle of the parasite (*Enterobius vermicularis*) and the location of its various stages within the intestine of the host. In this connection, Wright and Cram (*1*) have reviewed the theoretical considerations involved in the treatment of oxyuriasis and have outlined certain basic principles. One of these principles rests on the fact that pinworm infection is usually a familial condition involving several or all members of the family. In view of this fact, it appears futile from a control standpoint to treat some, but not all, infected individuals in a household, since treated individuals usually become reinfected promptly through ova scattered by nontreated individuals. Consequently, in all of the experiments reported in this paper, diagnostic tests were carried out on all members of each family represented and all infected individuals were treated simultaneously.

Diagnosis was made in all cases by means of the NIH cellophane swab described by Hall (*2*). The efficacy of the treatment was checked by the use of the same swab, it being our goal to obtain seven consecutive daily post-treatment swabs from each case. However, in some cases it was not possible to obtain this number of post-treat-

[1] See list of other papers in this series under References.

ment checks. Cram, Jones, Reardon, and Nolan (*3*) have shown that six NIH swab examinations will detect the great majority of pinworm infections and Sawitz, Odom, and Lincicome (*4*) found that seven swab examinations disclosed over 99 percent of the total infections in their series of cases. It was intended that the patients should use the post-treatment swabs beginning with the fourteenth day or later after termination of the treatment. However, in many cases instructions were not followed to the letter. The reason for selecting this time interval for taking the post-treatment checks has been discussed in detail in a previous paper (*5*) and is based on such facts as are known concerning the life cycle of the parasite.

All of the patients represented in these tests were treated as outpatients, most of them through a clinic for parasitic diseases maintained at Providence Hospital, Washington, D. C.

TESTS WITH SANTONIN

Results obtained in the treatment of 20 cases of oxyuriasis with santonin are given in table 1. Each patient received a single dose of the drug daily over a period of 10 days. The dose rate, as indicated in the table, was based on the age and physical condition of the patient at the time of treatment. Children were treated on the basis of the apparent rather than the chronological age. Since most of the children were undernourished and poorly developed, the dose of the drug in most cases was relatively small.

TABLE 1.—*Results of treatment of cases of oxyuriasis with santonin administered in a single dose daily over a period of 10 days*

Patient	Age	Daily dose for 10 days (grains)	Number of post-treatment swabs	Interval, in days, between end of treatment and first post-treatment swab	Results of post-treatment swab examinations
C. A.	14	1/4	8	15	Negative.
K. A.	11	1/4	8	15	Do.
J. C.	53	1	7	12	Do.
Mrs. J. C.	49	1	7	18	Do.
A. I.	8	1/4	6	27	Do.
Mrs. A. S.	[1]	1	7	10	Do.
Mrs. C. A.	[1]	1	5	13	Do.
Mr. G. A.	[1]	1	5	13	Do.
C. C. A.	11	1/4	5	18	Do.
A. A.	8	1/4	5	13	Do.
R. A.	5	1/4	5	13	Do.
W. R.	9	1/4	8	11	Positive.
B. R.	6	1/4	8	11	Do.
M. R.	12	1/2	8	11	Do.
Mrs. A. R.	[1]	1	8	11	Do.
M. S.	8	1/4	7	10	Do.
J. H. A.	15	1/4	5	13	Do.
G. A., Jr.	13	1/4	5	18	Do.
J. S.	17	1	8	7	Do.
I. W.	14	1	8	14	Do.

[1] Adult.

Eleven cases were found to be negative on post-treatment swabs. However, only 3 of these cases had 7 post-treatment checks; 1 had 6 swabs; 5 had 5 swabs each; and 2 had only 3 swabs each. There are grave doubts concerning the freedom from infection following the treatment of the patients who furnished only 3 post-treatment swabs. Most of those from whom 5 swabs were obtained were probably free from pinworms after treatment, although 2 additional swabs on these individuals might have disclosed some positive cases. Based on the evidence mentioned above, those patients who furnished 6 or 7 post-treatment swabs may reasonably be regarded as free from infection following the treatment.

Nine individuals were positive on post-treatment swabs. Thus, under the most favorable interpretation of the results, the efficacy of the treatment was at the rate of only 55 percent, and probably the actual efficacy was less than 50 percent, if due allowance is made for the insufficient number of post-treatment swabs on several of the so-called negative individuals. In spite of the fact that santonin has long been recommended as a treatment for pinworm infection, in these tests it was relatively ineffective for that purpose. From these results, the drug would certainly be unsatisfactory for the treatment of familial pinworm infections, since it would leave too many individuals still harboring pinworms the ova from which would probably cause reinfections in those few members of the family freed of infection by the treatment.

TESTS WITH HEXYLRESORCINOL [3]

Brown (*6*), who was the first to use hexylresorcinol in the treatment of oxyuriasis, reported cures in 5 cases following the administration of the drug orally and in a 1:1,000 suspension in enemas over periods varying from 2 to 13 weeks, and cures in 2 patients given hexylresorcinol enemas alone. However, Brown was unsuccessful in attempts to clear up infections by the oral administration of single doses of the drug.

More recently, Spaak (*7*) recommended the hospitalization of patients for 3 days and the use of hexylresorcinol over a period of 2 days, the patient receiving a purgative on the first day, hexylresorcinol both orally and by enema on the second day, and by enema only on the third day. This treatment is repeated in 14 days.

Craig and Faust (*8*) advised giving hexylresorcinol orally in the morning and by enema in the evening of the same day, this course of treatment to be repeated two or three times.

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[3] The hexylresorcinol used in these tests was furnished through the courtesy of Sharp and Dohme, Inc., Philadelphia, Pa.

TABLE 2.—*Results of treatment of cases of oxyuriasis with enemas of hexylresorcinol in a dilution of 1:2,000 in water*

Patient	Age	Interval of treatment period, in days; enemas administered on days indicated																											Number of post-treatment swabs	Interval, in days, between end of treatment and first post-treatment swab	Results of post-treatment swab examinations
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27			
B. R	6	X					X														X				X				5	7	Negative.
L. R	4	X					X														X				X				5	7	Do.
E. R	3	X					X														X				X				5	7	Do.
Mrs. S. T	(1)	X		X		X		X		X		X			X			X				X							6	10	Do.
J. S., Jr	3	X			X			X			X			X			X												7	14	Do.
P. S.[2]	5	X			X			X			X			X			X												7	16	Do.
B. T	6	X				X			X							X													3	13	Do.
P. T	4	X				X			X							X													3	13	Do.
Mrs. P	(1)	X			X			X			X			X		X													7	12	Do.
Mrs. D	(1)	X		X		X		X		X		X		X		X		X		X		X		X					6	35	Do.
Mrs. C. H	(1)	X		X		X		X		X		X			X			X			X		X						14	43	Do.
J. H	7	X		X		X		X		X		X			X		X			X			X						7	21	Do.
S. K	6	X		X		X		X		X		X		X			X			X			X						3	7	Do.
M. J	(3)	X		X		X		X		X		X			X			X			X			X					9	32	Do.
Mrs. S. R	(1)	X			X			X			X																		3	1	Do.
B. R	6	X		X		X		X		X		X		X		X			X			X							7	44	Do.
L. R	4	X		X		X		X		X		X		X		X			X			X							7	44	Do.
E. R	3	X		X		X		X		X		X		X		X			X			X							7	44	Do.
P. S	5	X			X			X			X			X			X												7	14	Positive.
G. C.[2]	9	X			X				X			X																	14	7	Do.
L. C.[2]	7	X			X				X			X																	14	7	Do.
D. C.[2]	4	X			X				X			X																	14	7	Do.
A. C.[2]	6	X			X				X			X																	14	7	Do.
M. A	7	X		X		X			X			X			X			X			X								7	18	Do.
Mrs. T	70	X		X		X		X		X		X		X		X		X		X		X		X					(4)	(4)	Do.
M. S	14	X		X		X		X		X		X		X			X			X			X			X		X	5	(?)	Do.
D. R	3	X			X			X			X																		3	1	Do.

[1] Adult.
[2] Hexylresorcinol jelly 1:1,000 used on nights when enemas were not given.
[3] 22 months.
[4] No swabs; continued migrations.

We have used hexylresorcinol in various ways, i. e., in enemas alone, in single doses orally, in repeated doses orally together with enemas, and in the form of a rectal jelly in a dilution of 1:1,000 in a water-soluble base both with and without enema treatment. The number of treatments and the interval between treatments have varied considerably for the reason that many of our tests were in the nature of preliminary trials designed to ascertain the minimum number of treatments needed to effect cures. As earlier attempts disclosed the ineffectiveness of relatively few treatments, we increased the number of treatments as appeared indicated. Relatively few patients were treated with certain methods, since a few tests were sufficient to demonstrate the ineffectiveness of the method.

Hexylresorcinol enemas.—In table 2 are presented the results of the treatment of 27 cases of oxyuriasis with hexylresorcinol enemas. Treatment instructions called for the use of a preliminary soapsuds enema, the expulsion of which was to be followed by an enema consisting of a 1:2,000 solution of hexylresorcinol in water. One quart of this solution was recommended for adults and as much as could be retained for children. The 1:2,000 solution was much more convenient for use by outpatients than was a 1:1,000 suspension, as recommended by Brown (*6*). Since the water-solubility of the drug is approximately 1:2,000, the patient was given a suitable number of vials, each containing 0.5 gram of the drug, with instructions to dissolve the contents of one vial in one quart of water. All enemas were to be taken at bedtime.

Nine of the 27 cases were positive and 18 negative on post-treatment swab examinations. We were unsuccessful in securing an adequate number of post-treatment checks in all cases. Of the negative patients, 1 furnished 14 swabs, 1 furnished 9 swabs, 7 furnished 7 swabs each, 2 furnished 6 swabs each, 3 furnished 5 swabs each, and 4 furnished only 3 swabs each. As stated previously, those patients on whom 6 or more negative post-treatment swabs were obtained may reasonably be considered as free from pinworms. Most of those having 5 negative swabs were probably free from pinworms, but those having only 3 negative swabs were doubtfully negative. Three of the patients, B. R., L. R., and E. R., each of whom received 4 enemas over a period of 24 days followed by negative swabs, had additional migrations several months later and were re-treated.

Five of the 9 positive cases received a total of only 4 enemas each, a number admittedly inadequate to eradicate most pinworm infections. Considering the multiple factors involved in attempting an appraisal of these experimental results, we are of the opinion that the data show hexylresorcinol enemas to be of definite value if used in repeated treatments over a sufficient period of time. For satisfactory results in most cases, it would appear that the use of at least 10 enemas

spaced over a period of 3 weeks is necessary; no doubt more consistent results would follow the application of more treatments over a longer period of time, since 2 of our patients who received 12 enemas were still positive following the treatment. The use of 1 ounce of 1:1,000 hexylresorcinol jelly inserted into the rectum at bedtime on the nights on which enemas were not given probably did not add materially to the efficacy of the treatment.

It is possible that better results might have been secured had we administered hexylresorcinol orally one or more times during the period of treatment with enemas. However, this was not done because of our inability to supervise the treatments closely. Many of the patients were of fairly low intelligence and the simpler the treatment the more likelihood that it would be carried out.

TABLE 3.—*Results of treatment of cases of oxyuriasis with hexylresorcinol (Caprokol) in a single dose orally*

Patient	Age	Dose of drug (grams)	Number of post-treatment swabs	Interval, in days, between end of treatment and first post-treatment swab	Results of post-treatment swab examinations
R. A.	5	0.4	5	17	Positive.
A. A.	8	.6	5	17	Do.
G. A.	13	.8	5	17	Do.
J. A.	15	.8	5	17	Do.

Hexylresorcinol in single doses orally.—Table 3 shows the results of the treatment of 4 cases of oxyuriasis with hexylresorcinol (Caprokol) in single doses orally. The Caprokol pills were administered at the dose rate and in the manner usually recommended. The patients received a light supper the evening before treatment, were given the Caprokol pills with a glass of water on an empty stomach the following morning, and were not allowed food until 4 hours later. A saline purgative was administered 24 hours after treatment.

All 4 of the patients treated in this manner were positive for pinworm ova on the post-treatment swab examinations. It is apparent that single oral doses of Caprokol are not dependably effective for the removal of pinworms.

Hexylresorcinol orally and by enema.—Table 4 records the findings in 3 patients treated with hexylresorcinol orally and by enema. One patient, J. S., was infected with both ascarids and pinworms and was negative for the ova of both parasites after a single dose of Caprokol followed by 4 hexylresorcinol enemas administered at 3-day intervals. Two other patients, treated in accordance with the above-mentioned recommendations of Craig and Faust (*8*), were positive for pinworms on post-treatment swab examinations.

TABLE 4.—*Results of treatment of cases of oxyuriasis with hexylresorcinol orally and by enema in a dilution of 1:2,000 in water*

Patient	Age	Oral dose of drug (grams)	Number of oral doses	Number of enemas	Number of post-treatment swabs	Interval, in days, between end of treatment and first post-treatment swab	Results of post-treatment swab examinations
J. S.	5	0.4	1	[1] 4	6	1	Negative.
B. C.	5	.4	[2] 3	[2] 3	7	8	Positive.
G. C.	8	.8	[2] 3	[2] 3	7	8	Do.

[1] Administered at 3-day intervals.
[2] Administered at weekly intervals.

It is our impression from these results and those recorded in table 3 that the oral administration of hexylresorcinol in the form of Caprokol pills does not constitute an effective treatment for oxyuriasis even when the oral dose of the drug is supplemented by an enema and repeated weekly for a period of 3 weeks. However, relatively few patients were included in this series and it is possible that additional tests might give more promising results, although we did not feel that our results were sufficiently encouraging to warrant a continuation of the tests.

TABLE 5.—*Results of treatment of cases of oxyuriasis with 1 ounce of 1:1,000 hexylresorcinol (Caprokol) jelly in a water-soluble base inserted into rectum at bedtime*

Patient	Age	Number of treatments administered	Period of treatment (days)	Number of post-treatment swabs	Interval, in days, between end of treatment and first post-treatment swab	Results of post-treatment swab examinations
N. McN.	2½	21	21	7	9	Negative.
M. J. A.	5	7	[1] 13	3	22	Do.
A. K.	1½	10	10	6	(?)	Positive.
B. J. T.	3	7	7	4	10	Do.
B. J. T.	3	10	10	7	10	Do.
N. McN.	4	21	21	7	9	Do.
M. P. A.	7	7	[1] 13	3	22	Do.
R. H. W.	12	33	88	33	1	Do.

[1] Soapsuds enema given on nights on which jelly was not used.

Hexylresorcinol jelly.—Eight patients were treated with hexylresorcinol jelly without supplementary therapy. The results of these tests are recorded in table 5. Approximately 1 ounce of the jelly containing hexylresorcinol (Caprokol) in a dilution of 1:1,000 was inserted into the rectum at bedtime by means of a metal pile pipe screwed on the head of a collapsible tube containing the material. It was hoped that the use of the jelly in this manner might kill worms coming in contact with it in the rectum, thus preventing the migration of gravid females, and that it might kill ova as well as worms. The jelly was used every night or every other night for varying periods of time, as indicated in the table. Six of the eight patients were positive on post-treatment

swab examinations. Of the 2 negative cases, 1 was doubtfully negative since only 3 post-treatment swabs were furnished. Other patients, not recorded in table 5, were also treated with the jelly. Owing to the fact that migration of gravid female pinworms occurred in these cases, other treatment was substituted. The results are not recorded in the table since the cases were not carried to completion.

Two patients treated with hexylresorcinol jelly were kept under close observation by one or more of us for varying periods of time. In both cases, following the insertion of the jelly into the rectum, gravid female pinworms migrated, sometimes within one-half hour after treatment. Embryonated ova from these worms developed normally when incubated in a moist chamber. From the results recorded in table 5, and from our personal observations on two of the cases, it would seem that hexylresorcinol jelly is not dependably effective for the destruction of gravid females in the rectum; neither will it always prevent the migration of gravid females nor render nonviable the ova deposited by migrating females.

While our tests indicate that hexylresorcinol enemas are of value in the treatment of cases of oxyuriasis when given in repeated treatments over a sufficient period of time, this method of therapy has two disadvantages. The drug is expensive and, in order to be effective in most cases, it must be given over a considerable period of time, this second objection being applicable also to any sort of treatment by enemata alone. Both of these features are particularly disadvantageous in the case of large family groups, since the cost of the treatment would be prohibitive for those in the lower economic brackets, and since few parents have the persistence to carry out repeated enema administrations over a period of 3 or more weeks either on themselves or on a large number of children.

THE USE OF ANAL OINTMENTS

The use of anal ointments is recommended frequently in the medical literature as an adjunct to oxyuriasis treatment for the ostensible purpose of inhibiting migration of gravid female worms or of killing ova expelled by migrating worms. Studies indicate that very few of the many ointments recommended in the literature actually have any lethal effect on the ova, even in laboratory tests in which the ova are covered by the ointment. Furthermore, when applied to the anal region, the ointments tested have been of no value in restricting the migration of the gravid females or in killing the ova deposited by them. Some of these ointments appear to be of value in helping to allay the pruritis caused by the migration of the female worms and their movements on the skin, but are of little or no value from the standpoint of controlling the pinworm infection.

TREATMENT WITH NONMEDICATED ENEMAS

The use of nonmedicated enemas has a certain advantage in that the treatment is without cost, provided the necessary apparatus for administering the enemas is at hand. Such enemas are useful in treating pinworm infections in infants and young children too small to take oral therapy satisfactorily. Cram and Nolan (*9*) reported on the incidence of pinworms in pupils in a private nursery school and described measures employed for the control of such infections under the difficult conditions for control existing in an institution of this kind. The major therapeutic measure employed in the case of these children consisted in the frequent use of nonmedicated enemas supplemented by other therapy in a few persistent infections. The marked reduction in the number of pinworm positives in the institution over the period studied gave evidence concerning the usefulness of such enemas. The protocols of these cases are not available since we were unable to secure detailed information concerning the number of enemas given or the frequency of the treatments in the different individuals. However, evidence obtained from other cases substantiates these observations.

In most cases, the minimum routine necessary to bring about cure consists in the administration of an enema every other night at bedtime over a period of at least 3 to 4 weeks. Many cases require more prolonged treatment. The efficacy of any enema treatment is perhaps correlated with the personal habits of the individual and the degree of exposure encountered in the household; some individuals possess habits which are conducive to maintaining a heavy pinworm infection by repeated reinfection through the intake of large numbers of pinworm ova. Cases of this sort are difficult to deal with by means of enemas, and some of them require prolonged enema treatment before a satisfactory result can be obtained. One of the limiting factors in the administration of enemas over relatively long periods of time is the interference with normal evacuations. Consequently, such therapy may be of definite disadvantage in those persons with a tendency to constipation.

SUMMARY AND CONCLUSIONS

In experiments reported in this paper, diagnostic examinations were made on all members of each family represented and all members infected with pinworms were treated at the same time in an effort to eliminate simultaneously all sources of pinworm infection within the household. Diagnosis was made and the efficacy of the treatments was checked by use of the NIH cellophane swab. Effort was made to obtain 7 consecutive daily post-treatment swabs on each patient, evidence indicating that the use of 7 swabs will detect nearly all cases of pinworm infection. However, some patients failed to furnish the necessary number of swabs.

Twenty patients were treated with santonin in a single dose daily over a period of 10 days. Nine of these cases were positive and 11 were negative on post-treatment swab examinations. However, 5 of the patients furnished only 5 post-treatment swabs each, and 2 only 3 swabs each. If due allowance is made for the insufficient number of swabs, the efficacy of the treatment was probably at the rate of less than 50 percent.

Eighteen of 27 cases treated with a varying number of enemas consisting of hexylresorcinol in a dilution of 1:2,000 in water were negative on post-treatment swab examinations. Some of the positive patients received an inadequate number of enemas. Results show that such enemas are of considerable value in the treatment of pinworm infections. Ten enemas spaced over a period of 3 weeks constitute the minimum number necessary usually to eradicate pinworm infections; some cases require more prolonged treatment.

Hexylresorcinol administered in the form of Caprokol pills in a single dose orally failed to eradicate pinworm infections in the 4 cases treated in this manner.

One of three patients treated with hexylresorcinol orally and by enema was negative on post-treatment swab examinations. While relatively few patients were included in our series, the oral administration of hexylresorcinol in the form of Caprokol pills apparently does not constitute an effective treatment for oxyuriasis, even when supplemented by an enema and repeated weekly for a period of 3 weeks.

Eight pinworm patients were treated by the use of 1 ounce of 1:1,000 hexylresorcinol (Caprokol) jelly inserted into the rectum at bedtime over varying periods of time. This treatment was found ineffective in controlling pinworm infections.

Some of the anal ointments recommended in the medical literature appear to be of value in helping to allay the pruritis occasioned by the migration of gravid female pinworms but anal ointments in general are of little or no aid in the control of pinworm infections.

Nonmedicated enemas, including soapsuds and saline enemas, are sometimes of advantage in treating pinworm infections in infants and young children. Satisfactory results are usually not obtained unless enemas are repeated every other night for at least 3 to 4 weeks. Many cases require more prolonged treatment.

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THE SIGNIFICANCE OF THE EXCRETION OF LEAD IN THE URINE[1]

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The excretion of lead which has entered the body either by the inhalation of gaseous or of solid compounds (dust), or by the ingestion of various lead-containing substances, occurs chiefly through either the gastrointestinal tract or the kidneys. Such other avenues of excretion as saliva, perspiration, milk, or nasal or lachrymal secretions are apparently of negligible importance.

Since lead was first found to occur in the excretions in lead poisoning by Devergie (*1*), attention has been increasingly directed towards the amount of excreted lead as an index of lead poisoning. Following Devergie's investigation a great deal of literature has accumulated dealing with the fecal and urinary excretion of lead.

Abdominal colic has been one of the important early symptoms of lead poisoning, and it was natural that the earlier investigators of lead poisoning turned their attention to the gastrointestinal tract in an effort to ascertain the cause of the colic. The irregular contraction of the intestine noted by Oliver (*2*) led him to ascribe the colic to interference with the rhythmic contractility of the smooth muscle owing to the local action of lead. Mann (*3*) found that most of the lead ingested orally by man was excreted in the feces, and more recent work (*4*) has shown that, in one case where lead arsenate was used, this excretion may reach as high as 97.5 percent of the total amount ingested. Lead has long been known to have a cumulative action, and amounts ingested or inhaled, which would be insignificant in themselves, may eventually cause lead poisoning. The threshold quantity necessary to bring about poisoning is thought to vary somewhat with individuals, and according to age and sex. When lead is

[1] From the Division of Industrial Hygiene, National Institute of Health.

ingested beyond the capacity of the body to eliminate it in the excretions, the further protective mechanism of the organism as a whole is that of storage. The lead is immobilized to an extent by storage in the bone tissue (*5*). It is incorrect, however, to consider that all the lead which enters the gastrointestinal tract or the respiratory tract is stored. While the extent to which storage occurs in man at different levels of lead intake is still unknown, minute quantities of lead are apparently efficiently removed from the body by the excretory processes (*6*).

Because of the occurrence of relatively large amounts of lead in the feces of lead-exposed individuals, fecal lead for a time assumed some importance as an aid in diagnosis.

The significance to be attached to fecal lead is still, however, somewhat in doubt. How much of it represents lead that has simply passed through the gastrointestinal tract completely unabsorbed is not known. Mann (*7*), in his study of the excretion of lead in individuals ingesting lead acetate administered therapeutically, found that soluble lead salts were converted into an insoluble form and eliminated in the feces. Numerous investigators have found lead in the bile in acute and chronic poisoning and the assumption has been made that lead passing through the gastrointestinal tract is absorbed, removed from the circulation by the liver, and re-excreted in the bile. Behrens and Baumann (*8*) found that the intravenous injection of radioactive lead in rats was quickly followed by the appearance of lead in the bile, and that the bile lead reached a maximum after 14 minutes. The form in which lead is excreted in the bile is unknown, and, indeed, the proportion of lead absorbed in the alimentary tract to the total amount of lead ingested still awaits determination.

In view of our lack of knowledge of what happens to lead in its passage through the gastrointestinal tract, the lead content of the feces is of no practical significance at the present time, beyond indicating a certain degree of lead exposure.

More weight can be attached to the urinary excretion of lead. Following the ingestion of lead, the proportion that is excreted in the urine is small compared to that excreted through the gastrointestinal tract, but much more importance can be attached to urinary lead values. Urinary lead definitely indicates absorbed lead, that is, lead that has passed into the blood stream and which has finally been removed from the blood and excreted by the kidneys. This lead has presumably entered most intimately into the structure of the body and has in turn bathed all the tissues and cells comprising the organism as a whole. Some significance can be attached, therefore, to the amount of lead excreted by the kidneys. The quantity of output can be affected by varying the physiological condition, i. e., by the production of an acidosis (*9*) or by the feeding of parathyroid extract

(*10*). On the other hand Litzner, Weyrauch, and Barth (*11*) made the interesting observation that output of lead is independent of diuresis.

However, the output of urinary lead in individuals exposed to lead in one form or another does vary somewhat and is probably affected by the physiological condition of the individual. There apparently exists some confusion of thought with regard to the significance to be attached to the presence of lead in the urine. Since the presence of lead in any quantity in the urine has been used as a diagnostic aid in lead poisoning some have concluded that the presence of lead is evidence *per se* of lead poisoning. Other investigators have stated that there is a "normal" figure above which the amount of lead may have clinical significance and below which it is of no consequence. The concept of "normal lead" is not new, for Devergie, in 1836, objected to the term as conveying the idea of an indispensable, or physiologically essential, substance; and shortly afterward Orfila, Devergie, Flandin, and Danger made it the subject of active investigation.

While no one questions the fact that traces of lead may occur in the urine, the actual amounts are generally low, below those found in groups of individuals who are definitely exposed to lead. The question then is not so much the amount, but rather the significance of urinary lead output taken in relation to other clinical findings.

In brief, the excretion of a tenth or even of several tenths of a milligram of lead in the urine per day does not necessarily indicate that the individual has lead poisoning, any more than the absence or presence of only a few micrograms of urinary lead per day in a case of lead poisoning (which not infrequently occurs) is an indication that the individual does not have lead poisoning.

In other words the presence of urinary lead merely indicates that the individual has been exposed to lead in some form and that absorption of lead has occurred. It is necessary, therefore, to consider the excretion of lead and particularly that of urinary lead only in connection with other diagnostic findings in relation to lead poisoning. It should be emphasized that the presence of lead in the urine indicates lead absorption only, and in the absence of other signs and symptoms is of itself insufficient diagnostic evidence of lead poisoning.

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SIPHONAPTERA: NOTES ON SYNONYMY OF NORTH AMERICAN SPECIES OF THE GENUS *HOPLOPSYLLUS* BAKER[1]

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Several species of the flea genus *Hoplopsyllus* infest wild hares and rabbits in North America. The following have been described: *H. glacialis glacialis* (Tasch.) 1880, *H. glacialis lynx* (Baker) 1904, *H. affinis* (Baker) 1904, *H. foxi* Ewing 1924, *H. powersi* Fox 1926, and *H. minutus* Fox 1926. Incident to a study of these fleas it has been apparent that the validity of some of the species is questionable, and available materials and data appear to warrant the following notes.

H. glacialis glacialis and *H. glacialis lynx* are morphologically very similar. On the basis of the few specimens of the former available for examination (received from Dr. Karl Jordan) the only difference between the two appears to be in size, *glacialis lynx* being notably smaller. However, on the grounds of host relationships and geographical distribution, it is probably desirable for the present, at least, to retain the subspecific distinction. *H. glacialis glacialis* is regarded as being restricted to the arctic hares (*Lepus arcticus* subspp.) and their predators, while *H. glacialis lynx* is restricted to the varying hares (*Lepus americanus* subspp.) and their predators, principally *Lynx* spp.

H. affinis is unquestionably distinct and valid. Remaining to be considered are *H. foxi*, *powersi*, and *minutus*, all described from California, the brush rabbit, *Sylvilagus bachmani*, being the type host.

As to *H. foxi* and *H. powersi* there is at hand a male flea forwarded by Mr. Benjamin J. Collins, formerly of the Division of Zoology of the National Institute of Health, with the statement that it appeared to have been of the same lot as the type specimen of *foxi*, a male, with which it agreed, and like the type it bore the determination of "*H. affinis*" in the handwriting of Dr. Fox. Also, host, locality, and date of collection are the same as for the type. The writer has not seen the types of *powersi*, but has examined a series of determined speci-

[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.

mens which Mr. Collins compared with the types. When compared with the *foxi* specimen, this material shows some variation in the number of spines in the thoracic ctenidium and in the relative length of the spined and bristled processes of the male clasper, but these differences are not sufficient to permit its separation from *foxi*. Since *H. foxi* has priority, *powersi* becomes a synonym. Ewing (1924) pointed out distinguishing characteristics of *foxi* and *affinis*. *Foxi* is most closely related to *glacialis lynx*.

Only the female of *H. minutus* is known, and its description is inadequate. The spermatheca, as figured by Fox, is indistinguishable from that of *foxi*. The type specimen, the only one known, is in the United States National Museum. Collins, in correspondence, stated, "With the exception of its small size and the reduction in the number of spines in the thoracic ctenidium, I was unable to find any differences." It appears certain that the description was based on a dwarfed specimen of *foxi*. *H. minutus* then becomes a synonym.

SIPHONAPTERA: A LIST OF ALASKAN FLEAS[1]

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Few records of fleas in Alaska have appeared in the literature. Prior to 1938 only four species were known. In that year Medical Entomologist C. B. Philip (*1*), of the Rocky Mountain Laboratory, reported 12 species collected during the summer of 1937, 10 of which had not been previously reported. The accompanying list, which includes hitherto unreported collections and more detailed data on the specimens collected by Dr. Philip, comprises, we believe, a complete list of the Alaskan records up to the present time. Determinations were made by the authors unless otherwise stated.

The geographical proximity of northwestern North America of the Nearctic region to northeastern Asia of the Palearctic region, as well as the recognized close relationship of their respective vertebrate fauna, suggests the possibility of a similar relationship of their parasitic fauna. Such a relationship of the flea fauna was definitely shown by Wagner (*2*) incident to a study of fleas of western Canada, and further evidence is afforded by the accompanying Alaskan records. Although only about one-third of the North American genera of Siphonaptera are common to the Old World (*3*), yet 9 of the 11 genera reported for Alaska are also Palearctic. Five of the species listed, *Ceratophyllus garei*, *C. vagabunda*, *Mioctenopsylla arctica*, *Malaraeus penicilliger*, and *Hoplopsyllus glacialis*, are also Asiatic species, although

[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.

the Nearctic representatives of the last two have been assigned to distinct subspecies. Typical *H. glacialis*, which infests the arctic hare, *Lepus arcticus*, has not been reported for Alaska but is known to be circumpolar in distribution and probably does occur on the two Alaskan subspecies of arctic hare.

Nearctic distribution of the known Alaskan genera and species is also of interest. *Mioctenopsylla* so far appears limited to the arctic or subarctic region. The other 10 genera extend southward into the United States, 7 occurring in both eastern and western States, while 3, namely, *Arctopsylla*, *Thrassis*, and *Malaraeus*, have been found only in the West. Four of the species, namely, *H. glacialis lynx*, of the varying hare, *Orchopeas caedens durus* and *Monopsyllus vison*, of the red squirrel, and *Oropsylla arctomys*, of the marmot, extend into both eastern and western States and are probably continuous in their distribution across northern North America, coincidental with the occurrence of their hosts.

SPECIES LIST

1. *Arctopsylla ursi* (Rothschild) 1902.
   Black bear, *Ursus americanus*, Funny River, Anchorage, September 3, 1935.
   23 ♂♂, 33 ♀♀. Collected by Jack O'Connor.
2. *Ceratophyllus garei* Rothschild 1902.
   Ptarmigan, *Lagopus leucurus*, Mills Creek, June 28, 1937.
   3 ♂♂, 6 ♀♀ from nest.
3. *Ceratophyllus niger* Fox 1908.
   Herring gull, *Larus argentatus*, Skilak Lake, June 25, 1937.
   54 ♂♂, 87 ♀♀. Collected and reared from 3 nests.
   Double-crested cormorant, *Phalacrocorax auritus*, Skilak Lake, June 25, 1937.
   21 ♂♂, 16 ♀♀. Collected and reared from 3 nests.
4. *Ceratophyllus vagabunda* (Boheman) 1865.
   Golden eagle, *Aquila chrysaetos*, Bear Creek, Rapids, July 15, 1937.
   1 ♂, 2 ♀♀. From fledglings and nest. Determined by Dr. Karl Jordan.
5. *Hoplopsyllus glacialis lynx* (Baker) 1904.
   Varying hare, *Lepus americanus*, Circle, July 7, 1937 (3 hosts).
   3 ♂♂, 5 ♀♀.
   Rapids, July 19, 1937 (2 hosts).
   1 ♂, 1 ♀.
   Gulkana, July 21, 1937 (2 hosts).
   1 ♂, 8 ♀♀.
   Chitina, July 23, 1937 (10 hosts).
   13 ♂♂, 24 ♀♀.
   Killey River, Kenai Peninsula, September 26, 1938. 3 ♂♂, 3 ♀♀. Collected by Jack Warwick.
   Lynx sp. Dahl River, Yukon, Alaska, December 25, 1935. 9 ♂♂, 20 ♀♀.
6. *Leptopsylla* sp. (probably *hamifer* (Rothschild) 1906).
   Field vole, *Microtus* sp., Valdez Creek, September 23, 1937.
   1 ♀.
   Varying hare, *Lepus americanus*, Fairbanks, September 11, 1937.
   1 ♀ (accidental host).

7. *Malaraeus penicilliger dissimilis* Jordan 1938.
   Field vole, *Microtus* sp., Flat, March 1925. Recorded by Jordan (1929).
   Red-backed mouse, *Evotomys dawsoni*, Rapids, July 1937.
   3♂♂, 3♀♀. Determined by Dr. Karl Jordan.
   Field vole, *Microtus* sp., Fairbanks, July 1937.
   2♂♂.
   Cantwell, 1937.
   1♂. Collected by D. G. Nichols.
   Varying hare, *Lepus americanus*, Rapids, July 19, 1937.
   1♂ (accidental host).
8. *Megabothris quirini* (Rothschild) 1905.
   Red-backed mouse, *Evotomys dawsoni*, Rapids, July 13, 1937.
   1♂, 1♀.
   Field vole, *Microtus* sp., Fairbanks, July 13, 1937.
   3♂♂, 1♀. Determined by Dr. Karl Jordan.
9. *Monopsyllus ciliatus protinus* (Jordan) 1929.
   Pine squirrel, *Sciurus hudsonicus*, Seward, June 18–20, 1937.
   3♂♂, 4♀♀.
10. *Monopsyllus vison* (Baker) 1904.
   Pine squirrel, *Sciurus hudsonicus*, Lake Bennet, Yukon Territory, Alaska, June 19, 1937.
   4♂♂, 7♀♀. (This series shows much variation in shape of sternite VII.)
   Seward, June 18–20, 1937.
   9♂♂, 3♀♀.
   Skilak Lake, June 25, 1937.
   7♂♂, 9♀♀.
   Marmot, *Marmota monax*, Fairbanks, July 17, 1937.
   1♂ (accidental host).
11. *Orchopeas caedens caedens* (Jordan) 1925.
   Pine squirrel, *Sciurus hudsonicus*, Lake Bennet, July 19, 1937.
   3♂♂, 3♀♀.
12. *Orchopeas caedens durus* (Jordan) 1929.
   Pine squirrel, *Sciurus hudsonicus*, Seward, June 18-20, 1937.
   5♂♂, 15♀♀.
   Skilak Lake, June 25, 1937.
   2♂♂, 1♀.
   Ground squirrel, *Citellus* sp., Cantwell, July 10, 1937.
   2♀♀ (accidental host).
13. *Oropsylla arctomys* (Baker) 1904.
   Marmot, *Marmota monax*, Fairbanks, July 17, 1937.
   4♂♂, 6♀♀.
14. *Mioctenopsylla arctica* Rothschild 1922 (=*Boreopsyllus hadweni* (Ewing) 1927, fide Jordan, 1932).
   Sabins gull, *Xema sabini*, Puffin Island, Alaska (recorded by Ewing, 1927).
15. *Oropsylla alaskensis* (Baker) 1904.
   Ground squirrel, *Citellus barrowensis*, Point Barrow (recorded by Baker 1904.)
16. *Oropsylla idahoensis* (Baker) 1904 (=*O. bertholfi* (Fox) 1927 fide Jordan, 1933).
   Ground squirrel, *Citellus nebulicola*, Nagai Island, Alaska, 1909 (recorded by Fox, 1927).
   Ground squirrel, *Citellus plesius*, Rapids, July 16, 1937.
   26♂♂, 41♀♀. (These specimens were reported as *Oropsylla* n. sp. by Philip (1938). They differ slightly from topotypes of *O. idahoensis*, but these differences are not considered sufficient to establish a new species.)

Ground squirrel, *Citellus* sp., Cantwell, July 1937.
9♂♂, 17♀♀.
Wolverine, *Gulo luscus*, Bear Creek, Rapids, July 18, 1937.
1♂ (accidental host).

17. *Thrassis acamantis* (Rothschild) 1905.
Marmot, *Marmota caligata*, Seward, June 15, 1937.
10♂♂, 11♀♀.

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(*3*) Jordan, K.: On some problems of distribution, variability, and variation in North American fleas. Transactions of the 4th International Cong. of Entomology, Ithaca, N. Y., **2**: 489–499 (1929).

DEATHS DURING WEEK ENDED OCTOBER 21, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 21, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,851	7,973
Average for 3 prior years	[1] 8,068	
Total deaths, first 42 weeks of year	346,902	340,704
Deaths under 1 year of age	447	478
Average for 3 prior years	[1] 513	
Deaths under 1 year of age, first 42 weeks of year	21,000	22,109
Data from industrial insurance companies:		
Policies in force	66,567,106	68,263,546
Number of death claims	11,720	13,245
Death claims per 1,000 policies in force, annual rate	9 2	10.1
Death claims per 1,000 policies, first 42 weeks of year, annual rate	10.0	9.8

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median
NEW ENG.												
Maine	12	2	3	2	......	......	2	......	12	2	5	14
New Hampshire	0	0	0	0	......	......	1	......	41	4	1	1
Vermont	0	0	0	0	......	......	......	......	268	20	4	4
Massachusetts	8	7	7	7	......	......	......	......	86	73	78	47
Rhode Island	8	1	1	0	......	......	......	......	153	20	0	3
Connecticut	0	0	0	2	3	1	5	1	24	8	29	20
MID. ATL.												
New York	7	18	29	30	[1] 6	[1] 8	[1] 17	[1] 7	36	89	135	122
New Jersey [2]	11	9	7	10	4	3	5	7	8	7	16	23
Pennsylvania	17	34	22	25	......	......	......	......	19	38	46	53
E. NO. CEN.												
Ohio	26	34	70	70	14	18	......	9	13	17	24	58
Indiana [2]	46	31	28	35	4	3	10	27	21	14	5	6
Illinois	21	32	35	42	7	11	8	8	9	13	15	20
Michigan [3]	3	3	20	20	5	5	......	2	71	67	44	24
Wisconsin	0	0	3	5	26	15	37	26	25	14	67	55
W. NO. CEN.												
Minnesota	6	3	2	6	6	3	2	1	23	12	82	14
Iowa	22	11	25	18	2	1	2	......	10	5	9	5
Missouri	18	14	21	62	......	......	15	35	5	4	9	26
North Dakota	0	0	14	4	29	4	6	2	51	7	107	3
South Dakota	38	5	2	2	......	......	5	......	210	28	26	3
Nebraska	4	1	2	2	......	......	......	......	8	2	1	1
Kansas	8	3	4	12	20	7	1	2	120	43	2	3

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	1	1	------	------	------	------	20	1	1	1
Maryland [3]	34	11	1	10	28	9	6	6	15	5	37	7
Dist. of Col	8	1	6	8	------	------	1	1	16	2	1	1
Virginia	172	92	77	77	88	47	60	------	11	6	9	15
West Virginia	75	28	28	42	------	------	10	16	5	2	7	7
North Carolina [4]	267	183	142	138	7	5	------	8	99	68	51	80
South Carolina [4]	85	31	41	14	604	221	358	185	3	1	2	6
Georgia [4]	101	61	61	57	53	32	36	------	3	2	2	0
Florida [4]	24	8	11	18	6	2	1	1	3	1	23	2
E. SO. CEN.												
Kentucky	38	22	50	50	2	1	34	11	5	3	17	85
Tennessee [4]	51	29	58	68	9	5	25	22	4	2	1	2
Alabama [4]	77	44	53	45	93	53	33	33	4	2	6	6
Mississippi [3]	43	17	18	18	------	------	------	------	------	------	------	0
W. SO. CEN.												
Arkansas	60	24	34	23	60	24	41	12	10	4	8	2
Louisiana [4]	51	21	25	28	60	25	1	10	2	1	1	2
Oklahoma	24	12	26	25	141	70	33	32	4	2	13	1
Texas [4]	15	18	77	75	161	194	189	134	6	7	19	8
MOUNTAIN												
Montana	9	1	1	1	37	4	10	10	477	51	91	34
Idaho	0	0	0	0	------	------	------	3	92	9	18	4
Wyoming	65	8	1	1	44	2	------	------	764	35	2	2
Colorado	43	9	11	11	29	6	14	------	87	18	0	6
New Mexico	12	1	3	3	12	1	13	2	12	1	19	19
Arizona	61	5	3	8	712	58	66	22	25	2	2	3
Utah [3]	0	0	1	1	20	2	17	------	70	7	29	8
PACIFIC												
Washington	6	2	1	2	------	------	------	------	706	229	11	11
Oregon	5	1	4	3	40	8	21	21	85	17	5	7
California [4]	7	8	24	42	11	13	8	19	45	55	279	137
Total	33	840	1,053	1,053	41	861	1,093	698	41	1,020	1,359	1,359
43 weeks	17	17,893	22,487	22,487	172	156,891	52,719	108,928	333	354,791	769,163	678,037

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	2	54	9	7	10
New Hampshire	0	0	0	0	0	0	0	0	30	3	3	3
Vermont	0	0	0	0	40	3	0	0	147	11	0	5
Massachusetts	1.2	1	1	2	6	5	2	2	38	32	73	109
Rhode Island	0	0	0	0	0	0	0	0	23	3	2	10
Connecticut	0	0	0	0	0	0	0	2	89	30	23	34
MID. ATL.												
New York	0.4	1	3	6	17	42	1	10	52	130	176	237
New Jersey [3]	1.2	1	0	0	6	5	0	1	70	59	42	62
Pennsylvania	2	4	3	3	8	16	2	4	95	187	192	233

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0.8	1	3	3	6	8	2	6	130	169	287	287
Indiana [3]	0	0	3	3	10	7	0	3	150	101	110	121
Illinois	2	8	2	3	5	8	1	15	137	209	213	273
Michigan [3]	2.1	2	2	2	26	25	1	9	188	178	305	196
Wisconsin	1.8	1	0	1	5	3	0	1	172	98	137	150
W. NO. CEN.												
Minnesota	1.9	1	0	1	25	13	0	1	149	77	56	78
Iowa	2	1	0	1	34	17	2	2	138	68	62	62
Missouri	0	0	0	0	1.3	1	0	1	82	64	66	70
North Dakota	7	1	0	0	7	1	0	0	226	31	10	28
South Dakota	0	0	0	0	30	4	1	1	105	14	33	33
Nebraska	0	0	0	0	4	1	0	0	92	21	15	21
Kansas	0	0	1	0	2.8	1	0	3	187	67	96	88
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	138	7	5	5
Maryland [3]	0	0	3	2	6	2	2	1	108	35	8	52
Dist. of Col.	0	0	1	1	0	0	3	1	89	11	13	13
Virginia	1.9	1	2	3	4	2	4	4	126	67	49	65
West Virginia	0	0	4	2	2.7	1	0	1	231	86	90	110
North Carolina [4]	2.9	2	2	2	1.5	1	0	2	180	123	92	92
South Carolina [4]	2.7	1	1	1	2.7	1	0	0	74	27	17	14
Georgia [4]	1.7	1	0	0	3	2	0	1	63	38	25	33
Florida [4]	0	0	1	0	3	1	0	0	9	3	2	5
E. SO. CEN.												
Kentucky	3	2	2	2	9	5	1	3	127	73	94	77
Tennessee [4]	1.8	1	3	3	0	0	1	1	125	71	66	66
Alabama [4]	1.8	1	6	2	1.8	1	3	3	90	51	39	27
Mississippi [3]	2.5	1	2	0	0	0	3	2	41	16	15	17
W. SO. CEN.												
Arkansas	2.5	1	0	0	5	2	0	0	40	16	10	10
Louisiana [4]	2.4	1	0	1	2.4	1	0	1	29	12	13	15
Oklahoma	0	0	0	2	0	0	0	0	40	20	30	21
Texas [4]	0.8	1	1	1	2.5	3	1	4	40	48	84	56
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	290	31	23	38
Idaho	0	0	0	1	31	3	1	0	31	3	12	18
Wyoming	0	0	0	0	0	0	0	0	109	5	7	9
Colorado	0	0	0	2	43	9	1	0	111	23	26	27
New Mexico	0	0	1	0	86	7	0	0	86	7	14	15
Arizona	12	1	0	0	12	1	1	0	0	0	3	11
Utah [3]	0	0	0	0	70	7	0	0	99	10	11	17
PACIFIC												
Washington	0	0	1	1	3	1	0	4	126	41	21	34
Oregon	5	1	0	1	10	2	1	2	85	17	37	30
California [4]	2.5	3	1	2	29	35	0	14	87	106	168	168
Total	1.4	35	49	60	10	247	34	178	100	2,511	2,882	3,153
43 weeks	1.5	1,661	2,499	4,732	6	6,255	1,514	6,650	121	131,066	154,452	188,690

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended October, 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934-38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases	1934-38, median	Oct. 28, 1939, rate	Oct. 28, 1939, cases	Oct. 29, 1938, cases
NEW ENG.											
Maine	0	0	0	0	6	1	4	4	115	19	71
New Hampshire	0	0	0	0	0	0	1	0	0	0	4
Vermont	0	0	0	0	0	0	1	1	322	24	66
Massachusetts	0	0	0	0	1	1	1	2	113	96	81
Rhode Island	0	0	0	0	0	0	1	1	229	30	41
Connecticut	0	0	0	0	9	3	1	2	160	54	69
MID. ATL.											
New York	0	0	0	0	7	18	14	14	109	272	461
New Jersey [2]	0	0	0	0	6	5	2	4	136	114	145
Pennsylvania	0	0	0	0	8	15	36	20	124	245	209
E. NO. CEN.											
Ohio	0	0	0	0	5	6	13	18	130	169	153
Indiana [2]	1	1	4	3	4	3	3	7	46	31	10
Illinois	1	1	2	3	10	15	17	20	112	171	490
Michigan [3]	0	0	14	0	20	19	5	9	117	111	228
Wisconsin	0	0	0	0	2	1	0	4	278	158	336
W. NO. CEN.											
Minnesota	2	1	7	3	2	1	1	1	124	64	18
Iowa	12	6	1	3	4	2	2	6	36	18	9
Missouri	0	0	1	0	15	12	5	17	31	24	21
North Dakota	0	0	0	0	7	1	6	4	29	4	18
South Dakota	0	0	0	0	8	1	0	0	0	0	0
Nebraska	0	0	1	2	0	0	0	0	4	1	3
Kansas	0	0	0	1	8	3	0	4	6	2	21
SO. ATL.											
Delaware	0	0	0	0	59	3	0	4	79	4	4
Maryland [3]	0	0	0	0	31	10	9	9	173	56	21
District of Columbia	0	0	0	0	8	1	3	3	97	12	3
Virginia	0	0	0	0	11	6	14	22	45	24	49
West Virginia	0	0	0	0	8	3	8	11	22	8	20
North Carolina [4]	0	0	0	0	4	3	28	9	89	61	126
South Carolina [4]	0	0	0	0	36	13	8	8	19	7	35
Georgia [4]	0	0	0	0	25	15	9	9	7	4	12
Florida [4]	0	0	0	0	3	1	0	3	0	0	11
E. SO. CEN.											
Kentucky	0	0	0	0	9	5	13	13	101	58	54
Tennessee [4]	0	0	0	0	9	5	6	17	63	36	66
Alabama [4]	0	0	0	0	23	13	13	11	86	49	12
Mississippi [3]	0	0	0	0	13	5	4	6	------	------	------
W. SO. CEN.											
Arkansas	0	0	0	0	32	13	6	6	12	5	33
Louisiana [4]	0	0	0	0	22	9	8	15	82	34	1
Oklahoma	6	3	2	0	10	5	8	18	0	0	12
Texas [4]	1	1	6	1	12	14	50	35	12	14	47
MOUNTAIN											
Montana	0	0	9	10	56	6	3	3	47	5	17
Idaho	10	1	2	2	10	1	4	3	20	2	1
Wyoming	0	0	1	1	0	0	0	0	175	8	6
Colorado	34	7	7	1	29	6	3	3	63	13	20
New Mexico	0	0	0	0	99	8	5	26	99	8	20
Arizona	0	0	1	0	12	1	2	2	123	10	3
Utah [3]	0	0	0	0	0	0	0	0	387	39	15
PACIFIC											
Washington	6	2	1	8	9	3	4	4	37	12	43
Oregon	5	1	7	0	15	3	0	2	134	27	4
California [4]	1	1	10	0	7	9	10	12	110	134	139
Total	1	25	76	76	11	268	331	420	90	2,237	3,228
43 weeks	8	8,910	13,136	6,425	10	11,271	12,671	13,291	141	150,098	176,266

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Oct. 28, 1939, 2 cases as follows: New Jersey, 1; Indiana, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Oct. 28, 1939, 83 cases as follows: North Carolina, 4; South Carolina, 7; Georgia, 36; Florida, 3; Tennessee, 6; Alabama, 9; Louisiana, 4; Texas, 13; California, 1.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
August 1939										
Puerto Rico	49	19	1,241	24	2	-------	1	0	0	21
September 1939										
Arizona	8	121	5	6	5	3	18	4	0	34
Florida	40	14	62	7	1	12	14	16	0	12
Georgia	175	90	445	9	0	26	6	96	0	49
Hawaii Territory	6	4	-------	1	0	-------	4	0	0	1
Kansas	18	5	13	47	8	-------	11	180	1	14
Montana	4	30	-------	52	1	-------	2	40	4	8
Oregon	10	24	8	48	0	-------	12	33	2	27
Washington	7	5	-------	314	0	-------	3	74	0	35
Wisconsin	1	-------	-------	109	4	-------	26	-------	1	11

August 1939

	Cases
Puerto Rico:	
Chickenpox	9
Dysentery	15
Leprosy	2
Mumps	1
Ophthalmia neonatorum	6
Puerperal septicemia	11
Tetanus	20
Tetanus, infantile	4
Whooping cough	72

September 1939

	Cases
Chickenpox:	
Arizona	8
Florida	2
Georgia	13
Hawaii Territory	9
Kansas	23
Montana	59
Oregon	33
Washington	96
Wisconsin	219
Conjunctivitis, infectious:	
Georgia	11
Hawaii Territory	22
Dengue:	
Florida	1
Diarrhea, infectious:	
Kansas	1
Dysentery:	
Arizona	97
Florida (amoebic)	4
Georgia (ameobic)	11
Georgia (bacillary)	5
Georgia (unspecified)	3
Hawaii Territory (amoebic)	1
Kansas (bacillary)	2
Washington (bacillary)	1
Encephalitis, epidemic or lethargic:	
Arizona	1
Kansas	18
Montana	3
Washington	7
Wisconsin	1

September 1939—Continued

	Cases
German measles:	
Arizona	1
Kansas	4
Montana	1
Washington	5
Wisconsin	13
Glanders	
Kansas	1
Hookworm disease:	
Georgia	1,375
Hawaii Territory	16
Impetigo contagiosa:	
Hawaii Territory	20
Kansas	16
Montana	1
Oregon	64
Washington	10
Leprosy:	
Hawaii Territory	2
Mumps:	
Arizona	17
Florida	5
Georgia	48
Hawaii Territory	60
Kansas	94
Montana	53
Oregon	41
Washington	41
Wisconsin	183
Ophthalmia neonatorum:	
Hawaii Territory	1
Montana	1
Wisconsin	1
Rabies in animals:	
Florida	2
Oregon	1
Washington	14
Relapsing fever:	
Arizona	1
Rocky Mountain spotted fever:	
Kansas	1
Scabies:	
Kansas	11
Oregon	33
Septic sore throat:	
Florida	5
Georgia	42

September 1939—Continued

	Cases
Septic sore throat—Con.	
Kansas	4
Montana	3
Oregon	4
Washington	9
Wisconsin	5
Tetanus:	
Georgia	1
Hawaii Territory	1
Kansas	2
Washington	1
Trachoma:	
Arizona	40
Georgia	2
Hawaii Territory	3
Washington	4
Tularaemia:	
Georgia	9
Kansas	2
Montana	1
Typhus fever:	
Florida	28
Georgia	137
Hawaii Territory	14
Undulant fever:	
Arizona	4
Florida	2
Georgia	6
Kansas	7
Oregon	2
Washington	2
Wisconsin	16
Vincent's infection:	
Kansas	17
Oregon	7
Washington	2
Whooping cough:	
Arizona	80
Florida	17
Georgia	89
Hawaii Territory	203
Kansas	56
Montana	29
Oregon	106
Washington	76
Wisconsin	528

WEEKLY REPORTS FROM CITIES

City reports for week ended October 21, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	208	89	26	270	442	798	5	339	53	896	-------
Current week [1]	103	88	15	281	279	502	1	291	32	710	-------
Maine:											
Portland	0	1	1	0	2	2	0	0	0	4	18
New Hampshire:											
Concord	0	------	0	4	0	0	0	0	0	0	11
Manchester	0	------	0	0	1	3	0	0	0	0	13
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	4	10
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	1	------	0	10	11	20	0	6	1	16	196
Fall River	0	------	0	0	1	0	0	2	0	0	22
Springfield	0	------	0	0	0	2	0	1	0	7	30
Worcester	0	------	0	0	1	2	0	3	0	8	41
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	15
Providence	0	------	0	29	0	1	0	0	4	18	46
Connecticut:											
Bridgeport	0	------	0	0	0	1	0	2	0	0	29
Hartford	0	------	0	0	2	2	0	1	1	36	40
New Haven	0	------	0	4	2	1	0	2	0	3	49
New York:											
Buffalo	0	------	0	0	5	5	0	3	0	1	107
New York	14	11	1	16	42	81	0	61	6	89	1,351
Rochester	0	------	0	0	0	1	0	3	0	10	56
Syracuse	0	------	0	0	2	5	0	2	0	12	56
New Jersey:											
Camden	0	------	0	0	0	1	0	0	0	1	28
Newark	0	------	0	2	2	5	0	3	0	11	61
Trenton	0	------	0	0	0	2	0	1	0	2	85
Pennsylvania:											
Philadelphia	1	2	1	1	8	13	0	19	0	69	479
Pittsburgh	3	1	3	2	13	14	0	9	0	10	161
Reading	1	------	0	3	1	0	0	1	0	1	24
Scranton	0	------	------	0	------	2	0	------	0	1	------
Ohio:											
Cincinnati	7	------	1	2	6	18	0	1	0	6	123
Cleveland	1	5	0	5	9	13	0	5	1	56	183
Columbus	5	1	1	0	2	6	0	3	0	2	85
Toledo	0	------	0	2	1	9	0	2	0	5	64
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	9
Fort Wayne	0	------	0	0	1	6	0	0	0	0	22
Indianapolis	0	------	0	1	4	17	0	1	0	14	78
Muncie	0	------	0	0	5	2	0	1	0	0	16
South Bend	0	------	0	0	0	2	0	1	0	3	15
Terre Haute	3	------	0	1	0	2	0	1	0	0	18
Illinois:											
Alton	0	------	0	0	0	2	0	0	0	3	10
Chicago	10	5	1	5	24	67	0	34	0	66	663
Elgin	0	------	0	0	1	0	0	0	0	1	4
Moline	0	------	0	0	0	0	0	0	0	0	3
Springfield	0	------	0	1	5	1	0	1	0	2	23
Michigan:											
Detroit	1	------	0	5	5	57	0	16	2	30	247
Flint	0	------	0	2	0	3	0	1	0	2	22
Grand Rapids	0	------	0	1	0	5	0	0	1	3	43
Wisconsin:											
Kenosha	0	------	0	1	0	9	0	1	0	1	8
Madison	0	------	0	0	0	7	0	0	0	8	8
Milwaukee	2	------	0	3	3	26	0	4	0	22	90
Racine	0	------	0	0	0	0	0	0	0	2	10
Superior	0	------	0	0	0	0	0	0	0	0	8

[1] Figures for Barre, Vt., and Los Angeles, Calif., estimated, report not received.

City reports for week ended October 21, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0		0	0	1	0	0	0	0	4	20
Minneapolis	0		0	1	6	16	0	1	0	5	103
St. Paul	0		0	1	2	10	0	1	0	31	56
Iowa:											
Cedar Rapids	0			0		1	0		2	1	
Davenport	0			0		4	0		0	0	
Des Moines	0		0	3	0	14	0	0	0	0	29
Sioux City	0			0		5	0		0	1	
Waterloo	4			2		3	0		0	3	
Missouri:											
Kansas City	1		0	1	5	17	0	5	2	0	78
St. Joseph	0		0	1	4	2	0	0	0	0	35
St. Louis	3		0	0	6	9	0	7	0	13	189
North Dakota:											
Fargo	0		0	0	0	0	0	1	0	2	8
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	1	0	0	0	0	1
South Dakota:											
Aberdeen	0			0		1	0		0	0	
Sioux Falls	0		0	0	0	10	0	0	0	0	9
Nebraska:											
Lincoln	0			0		0	0		0	4	
Omaha	1		0	1	1	1	0	1	0	2	62
Kansas:											
Lawrence	1	3	0	0	1	0	0	0	0	0	7
Topeka	2	2	2	1	3	5	0	2	0	0	28
Wichita	1	1	0	9	1	3	0	0	0	0	25
Delaware:											
Wilmington	0		0	0	1	0	0	0	0	0	30
Maryland:											
Baltimore	1	4	1	0	11	6	0	11	0	34	205
Cumberland	0		0	0	0	1	0	1	0	0	18
Frederick	0		0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	4		0	1	11	12	0	3	1	7	142
Virginia:											
Lynchburg	6		0	0	0	2	0	0	0	15	11
Norfolk	3	8	0	0	2	2	0	0	0	0	21
Richmond	1		1	0	2	2	0	2	0	4	60
Roanoke	1		0	0	0	0	0	0	1	0	13
West Virginia:											
Charleston	0		0	0	0	0	0	0	1	0	3
Huntington	2			0		0	0		1	0	
Wheeling	0		0	0	1	2	0	0	0	2	16
North Carolina:											
Gastonia	2			0		0	0		0	0	
Raleigh	1		0	0	1	0	0	1	0	0	21
Wilmington	1		0	0	0	0	0	0	0	0	15
Winston-Salem	1		0	1	1	3	0	0	0	0	16
South Carolina:											
Charleston	3	5	0	0	1	0	0	2	1	0	13
Florence	2	29	0	0	1	2	0	0	0	2	11
Greenville	0		0	0	0	0	0	0	0	0	8
Georgia:											
Atlanta	4	16	0	0	1	3	0	5	0	0	78
Brunswick	0	1	1	0	0	0	0	0	0	0	3
Savannah	0	7	1	1	4	2	0	0	0	1	27
Florida:											
Miami	0		0	0	0	3	0	2	1	0	33
Tampa	2	1	1	0	1	0	0	0	1	0	33
Kentucky:											
Ashland	0	1	0	0	0	0	0	0	0	0	4
Covington	0		1	0	2	3	0	0	0	0	15
Lexington	0		0	0	0	0	0	1	1	0	17
Louisville	0		0	0	4	10	0	3	0	13	74
Tennessee:											
Knoxville	0		0	0	0	3	0	0	0	0	31
Memphis	0		0	0	0	4	0	5	0	15	63
Nashville	1		0	1	3	3	0	4	0	0	49
Alabama:											
Birmingham	2		0	0	2	2	0	2	0	0	55
Mobile	1	6	0	0	1	2	0	0	0	0	19
Montgomery	4	1		0		3	8		0	0	
Arkansas:											
Fort Smith	0			0		1	0			0	
Little Rock	0		0	0	0	3	0	2	0	0	

City reports for week ended October 21, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0		0	0	0	0	0	0	0	0	4
New Orleans	4	1	0	1	9	5	0	7	3	2	131
Shreveport	2		1	0	5	0	0	0	1	0	43
Oklahoma:											
Oklahoma City	0	2	0	0	3	1	0	1	1	0	41
Tulsa	0			0		1	0		0	0	
Texas:											
Dallas	3		0	0	3	1	0	3	0	0	55
Fort Worth	1		0	0	3	5	0	2	0	2	33
Galveston	0		0	0	3	1	0	0	0	0	13
Houston	0		0	0	1	4	0	3	0	2	68
San Antonio	1		0	0	2	2	0	0	5	0	57
Montana:											
Billings	0		0	1	1	1	0	0	0	0	6
Great Falls	1		0	1	0	0	0	0	0	2	10
Helena	0		0	0	0	1	0	0	0	0	1
Missoula	0	11	0	0	0	0	0	0	0	2	3
Idaho:											
Boise	0		0	0	1	0	0	0	0	0	6
Colorado:											
Colorado Springs	0		0	0	0	1	0	2	0	0	15
Denver	0		0	0	8	0	0	6	0	0	87
Pueblo	1		0	0	2	2	0	2	0	0	12
Utah:											
Salt Lake City	0		0	3	1	4	0	0	0	33	31
Washington:											
Seattle	0		0	13	4	2	1	4	0	2	93
Spokane	0		0	1	0	5	0	0	0	1	19
Tacoma	1		0	129	0	1	0	1	0	0	31
Oregon:											
Portland	1		0	0	3	10	0	2	0	0	77
Salem	0			5		0	0		0	0	
California:											
Los Angeles											
Sacramento	0		0	1	1	1	0	0	0	0	22
San Francisco	1	1	0	7	6	6	0	7	0	5	145

State and city	Meningitis meningococcus		Poliomyelitis cases
	Cases	Deaths	
Maine:			
Portland	0	0	1
Massachusetts:			
Boston	0	0	1
New York:			
Buffalo	0	0	17
New York	0	0	9
Rochester	0	0	5
Syracuse	0	0	1
New Jersey:			
Trenton	0	0	2
Pennsylvania:			
Philadelphia	0	0	11
Pittsburgh	0	0	3
Scranton	0	0	3
Ohio:			
Cleveland	0	0	3
Toledo	0	0	1
Illinois:			
Chicago	3	0	3
Michigan:			
Detroit	0	0	9
Flint	0	1	0
Grand Rapids	0	0	1
Wisconsin:			
Madison	1	0	0
Milwaukee	0	0	1
Minnesota:			
Minneapolis	0	0	7
St. Paul	0	0	3

State and city	Meningitis meningococcus		Poliomyelitis cases
	Cases	Deaths	
Iowa:			
Des Moines	0	0	6
Missouri:			
St. Louis	0	0	1
Kansas:			
Topeka	0	0	2
Wichita	0	0	1
Delaware:			
Wilmington	0	0	1
Maryland:			
Baltimore	0	0	2
District of Columbia:			
Washington	0	0	1
Alabama:			
Montgomery	0	0	1
Colorado:			
Colorado Springs	0	0	1
Pueblo	0	0	3
Utah:			
Salt Lake City	0	0	2
Washington:			
Seattle	0	0	1
Oregon:			
Portland	0	0	2
California:			
Sacramento	1	0	1
San Francisco	0	0	3

Encephalitis, epidemic or lethargic.—Cases: New York, 4; Wheeling, 1; Louisville, 1; Missoula, 1.
Pellagra.—Cases: Wichita, 1; Baltimore, 1; Charleston, S. C., 4; Florence, 3; Atlanta, 1; Savannah, 2; Birmingham, 1; Montgomery, 1; New Orleans, 2.
Typhus fever.—Cases: New York, 2; Charleston, S. C., 4; Savannah, 5; Tampa, 1; Dallas, 2; Houston, 2; San Antonio, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended October 7 and 14, 1939.—During the weeks ended October 7 and 14, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended October 7, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	1					2
Chickenpox			2	41	84	6	33	38	27	231
Diphtheria		2	3	39	1	3	11			59
Dysentery				3	1				5	9
Influenza		10			65	2				77
Lethargic encephalitis							1			1
Measles				39	31	3	2		9	84
Mumps				6	24	3	1	4	11	49
Pneumonia	1	4			8	1			9	23
Poliomyelitis				2	14			1		17
Scarlet fever		13	3	57	89	17	10	17	13	219
Trachoma									1	1
Tuberculosis	1	6	7	68	45	1	12			140
Typhoid and paratyphoid fever			3	19	5		2	5		34
Whooping cough		4		52	35	24	22	1	8	146

Week ended October 14, 1939

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1					2	3
Chickenpox		4	1	67	136	14	31	26	71	350
Diphtheria			2	28	1	2				33
Dysentery				12	12				6	30
Influenza		33			9				3	45
Measles		2		120	124	6		2	63	317
Mumps				16	48	1		1	11	77
Pneumonia		1			19		2		4	26
Poliomyelitis		1		3	12		2			18
Scarlet fever		7	8	65	105	24	4	30	18	261
Trachoma						5				5
Tuberculosis		3	8	94	48	39	1	2		195
Typhoid and paratyphoid fever		1	2	21	7	1	3	4	1	40
Whooping cough		22		33	41	48	83	16	22	265

NOTE.—No cases of the above diseases were reported from Prince Edward Island for the week ended October 14, 1939.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of October 27, 1939, pages 1950–1963. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Argentina—Tucuman.—During the period October 1 to 15, 1939, 1 case of plague was reported in the vicinity of Tucuman, Argentina.

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Sector.—A rat found on October 4, 1939, in Hamakua Mill Sector, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Smallpox

Venezuela—Tachira State—San Cristobal.—During the period September 1 to 15, 1939, 17 cases of smallpox (alastrim) were reported in San Cristobal, Tachira State, Venezuela.

Yellow Fever

Togo (French mandate)—Anecho.—On October 19, 1939, 1 case of yellow fever was reported in Anecho, Togo (French mandate).

X

Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

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Public Health Reports

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NURSING ACCOMPLISHMENTS AS REVEALED BY CASE RECORDS[1]

By MAYHEW DERRYBERRY, *Senior Public Health Statistician, United States Public Health Service*

This paper represents an inquiry into the accomplishments of field nurses through data obtained from the records which they have kept on their cases. Such a study offers one approach to an evaluation of nursing achievements, since individual case records have been generally assumed to furnish an index to the work performed and the results attained.

Individual case records set forth the nurse's story of a patient's condition, a story sometimes complete in one issue but more often continued through several. In a series of repeated instructions and services, one naturally looks for an accompanying upward line of progress in pupil or patient, and the data used herein have been analyzed for evidence of change in the total conditions which the nurses went out to see and came back to record.

In the past, evaluations of nursing services have been based upon volume and intensity of service in relation to the needs of the community. Evidence of the more elusive quality of service, as expressed by the changing state of the patient, has been sought in the present analysis. This change may be expressed in better management of the environment, improvement in health habits, a step forward on the road to recovery, and other items of a similar character. These cannot be said to depend wholly on the ministrations of the nurse, since one must take into consideration the limitations imposed by insufficiency of medical, clinical, and other physical facilities, by the economic status of those among whom the nurses are working, and by the intelligence of the patients.

The usual individual case records carry a list of the items which the nurses are to investigate through observation or inquiry. These

[1] From the Division of Public Health Methods, National Institute of Health. This is the nineteenth in a series of papers presenting an analysis of the procedures followed in county health departments, and the ninth paper dealing with the nursing activities. Grateful acknowledgment is made to Miss Pearl McIver and Miss Helen Bean who supervised the collection of the data and assisted in the preliminary planning of the study. Particular recognition is due Miss Georgie Brockett who prepared all the tabular material.

items pertain to the condition of the patient and the health practices that he follows. To reduce the time spent on record keeping, codes are used to indicate whether an item is satisfactory, or the degree to which it is unsatisfactory. The code customarily used is 0 for satisfactory; 1, 2, and 3 for slightly, moderately, and decidedly unsatisfactory, in the order named; and X for a condition that should have medical attention. Not only does this code provide a rapid means of recording observations, but it also reduces discursive material to a numerical basis, thus rendering these observations more susceptible to analysis.

It would seem logical that, under such a system of record-keeping, the nurse's comments on a case to which she had made more than one visit would indicate what had been accomplished. For example, if the nurse records a 3, which means decidedly unsatisfactory, for diet, sleep, or elimination at the time of her first visit, and on a return call enters a 1, which means slightly unsatisfactory, it would be assumed that she considered the condition improved. But if she still records a 3, the inference would be that she regarded the condition as just about the same. If she gives a 3 to some item which she coded as 0 on the previous visit, it should indicate that in her opinion the condition had grown worse.

True, a possibility of error lurks in this use of case records to evaluate accomplishments in that a nurse may not be exact in her judgments or may not keep precise records. Nevertheless, the record forms and the codes were designed to reveal conditions observed by the nurse on an initial visit and the subsequent change that took place. For that reason a study patterned after the above logic is in keeping with the original purpose of the record. It should be kept in mind that the nurses' entries make up the data, and the situations revealed are no more accurate than their judgments of the conditions which they observed and recorded.

The records used in the present analysis represent the visits made by the field nurses of two county health departments over a period of one year.[2]

The volume of data distributed according to the type of service represented is given in table 1. Although the number of cases included for each service is relatively small, the total observations made

[2] A complete description of the forms and the method of collecting the records of cases is given in the previous paper of this series entitled "Do Case Records Guide the Nursing Service?" (Pub. Health Rep., 54: 66-76 (1939)).

The characteristics of the counties and a description of the method of record-keeping followed by the nurses is given in four previous papers: Mountin, Joseph W.: Effectiveness and economy of county health department practice. Pub. Health Rep., 49: 1232-1241 (1934); Bean, Helen, and Hankla, Emily: Case records as an index of the public health nurse's work. Pub. Health Rep., 52: 1077-1088 (1937); Bean, Helen, and Brockett, Georgie S.: The family as a unit for nursing service. Pub. Health Rep., 52: 1923-1931 (1937); and Bean, Helen: Number and length of nursing visits as indices of nursing service. Pub. Health Rep., 53: 913-921 (1938).

by the nurses in each service are fairly large.[3] Since the study is concerned with the extent to which unsatisfactory items improved or satisfactory items became worse, the number and proportion of the items recorded as unsatisfactory on the first or second visit, or on both visits, are also given in the table. The number of unsatisfactory conditions is small in county B for school and adult health supervision, for postpartum and for communicable disease services, and in county C for postpartum and tuberculosis services. Even for these, the volume of data is sufficient to denote trends and to substantiate deductions made from the data in the other categories of service.

TABLE 1.—*Number of cases visited more than once for each type of service in the 2 counties and summary of items recorded as being unsatisfactory*

Type of service	Number of cases visited more than once	Number of items: Possible to observe on each case	Number of items: Total possible observations	Unsatisfactory on first visit, second visit, or both: Number	Unsatisfactory on first visit, second visit, or both: Percentage
Health supervision:					
Infant	107	24	2,568	626	24.4
Preschool	69	24	1,656	523	31.6
School and adult	42	5	[1] 192	50	26.0
Maternity					
Antepartum	68	20	1,360	447	32.9
Postpartum	33	9	297	57	19.2
Tuberculosis	182	12	[2] 2,177	251	11.5
Communicable disease	43	5	[3] 179	35	19.6
Health supervision:					
Infant	187	24	4,488	766	17.1
Preschool	27	24	648	162	25.0
School and adult	210	5	[1] 1,001	181	18.1
Maternity:					
Antepartum	67	20	1,340	443	33.1
Postpartum	49	9	441	75	17.0
Tuberculosis	32	12	[2] 352	87	24.7
Communicable disease	2,435	5	[3] 9,561	2,682	28.1

[1] Item "elimination" was omitted on early record forms.
[2] A small number of cases were reported on forms containing fewer items.
[3] Items "rest" and "elimination" were omitted on early record forms.

For the purposes of the tabular comparisons which constitute the basic analysis, the items were separated according to the factor of change between the first and second visits. The groups resulting from this division are as follows:

1. Items unsatisfactory on first visit but improved at time of second visit.
2. Items unsatisfactory on first visit; no improvement at time of second visit.

[3] Total number of observations is the number of items appearing on the case records multiplied by the number of cases.

3. Items unsatisfactory on first visit; nurse failed to observe and record condition at time of second visit.
4. Items unsatisfactory on first visit that became worse in interval between visits.
5. Items satisfactory on first visit but unsatisfactory on second visit.
6. Items satisfactory on both first and second visits.
7. Items left ungraded on both first and second visits.

The items in groups 1 to 4 are those on which the nurses would be expected to work for improvement and are, therefore, the most important to this analysis. Group 5 represents the negative changes that took place during the interval between two visits, and although on these items the nurses might not have worked specifically, the records show the conditions to be changed and for that reason data on this group are presented. Items in group 6 offer no evidence of change one way or the other and are of no value in studying accomplishments. It is possible that some of them changed for the better, but the records were not designed to reveal a condition of increasing satisfactoriness. Failure to record the satisfactory or unsatisfactory nature of certain conditions at the time of both the initial and subsequent visits makes it impossible to use the items in group 7 in measuring the nurses' achievements.

The items recorded as below par on the first visit are distributed in table 2 according to their condition on the second visit. It will be noted that about a third of all the items entered as unsatisfactory on the first visit were recorded by the nurse as improved when she returned.

The proportions of this improvement vary from 12 to 52 percent for the different services. Approximately the same proportions of the items show no change. Relatively few (less than 5 percent) of the items recorded as unsatisfactory grew worse, so far as these data reveal. The records are not designed, however, to show a downward change beyond a certain point. Markedly unsatisfactory is the final classification allowed by the code and such a condition growing worse, as it might conceivably do, would still be classified in this way.

In county B, 25 percent of the items recorded as unsatisfactory on the first call were given no grading by the nurse on her repeat calls. In county C, this omission of further grading occurred in 40 percent of the items first recorded as unsatisfactory. Why the nurse failed to enter her impressions on making a follow-up visit is debatable, since records that are to guide the future work or to serve as a measure of achievement must surely carry continued gradings on items recorded as unsatisfactory on the first visit. To be sure, many of these conditions may have improved, but the nurse's entries do not indicate

that they have, and records such as those used in this particular study are therefore deficient as indices of the nurses' accomplishment for over a fourth of the cases they served.

TABLE 2.—*Recorded changes between first and second visits in conditions originally unsatisfactory according to type of service*

Type of case	Number of items unsatisfactory on first visit	Percentage distribution of items unsatisfactory on first visit according to condition on second visit				
		Total unsatisfactory items	Improvement recorded	No change recorded	No observation recorded	Recorded as worse
All unsatisfactory items	1,521	100	34.5	37.1	24.6	3.8
Health supervision:						
Infant	424	100	45.8	34.2	15.8	4.2
Preschool	459	100	29.2	36.8	31.8	2.2
School and adult	43	100	11.6	32.6	53.5	2.3
Maternity:						
Antepartum	359	100	34.3	48.7	12.8	4.2
Postpartum	41	100	22.0	26.8	48.8	2.4
Tuberculosis	164	100	26.8	28.7	40.9	3.6
Communicable disease	31	100	51.6	12.9	16.1	19.4
All unsatisfactory items	3,961	100	31.8	27.4	39.7	1.1
Health supervision:						
Infant	585	100	45.0	33.8	19.7	1.5
Preschool	125	100	23.2	36.0	32.8	8.0
School and adult	141	100	19.1	36.9	44.0	----------
Maternity:						
Antepartum	387	100	30.5	56.9	9.8	2.8
Postpartum	62	100	42.0	40.3	14.5	3.2
Tuberculosis	79	100	17.7	65.8	12.7	3.8
Communicable disease	2,582	100	30.4	19.1	50.2	0.3

In table 3 is presented the number of satisfactory items that grew worse, and, for comparison, the number of unsatisfactory items that improved. In other words, the table shows the positive and negative changes that took place between visits, according to the nursing records. The net recorded change is given in the last column.

In county B the number of conditions recorded as having improved is the same as the number recorded as having grown worse. This statement, of course, is not applicable to each group of services. In some the greater number of items grew better, while in others the greater number grew worse, but a summary of the year's efforts shows that the degree of improvement recorded did not exceed the degree of deterioration. Perhaps the situations did improve more than these data indicate, but this analysis must deal perforce only with the facts as they appear on the records.

TABLE 3.—*Net changes recorded in number of unsatisfactory items between first and second visits*

Type of case	Number of items recorded as unsatisfactory on first visit	Number of items recorded as improved	Number of items recorded as growing worse			Net changes recorded
			Total	Unsatisfactory to worse	Satisfactory to unsatisfactory	
Total	1,521	526	525	57	468	....
Health supervision:						
Infant	424	194	220	18	202	−26
Preschool	459	134	74	10	64	+60
School and adult	43	5	8	1	7	−3
Maternity:						
Antepartum	359	123	103	15	88	+20
Postpartum	41	9	17	1	16	−8
Tuberculosis	164	44	93	6	87	−49
Communicable disease	31	16	10	6	4	+6
COUNTY C						
Total	3,961	1,261	478	43	435	+783
Health supervision:						
Infant	585	263	190	9	181	+73
Preschool	125	29	47	10	37	−18
School and adult	141	27	40	....	40	−13
Maternity						
Antepartum	387	118	67	11	56	+51
Postpartum	62	26	15	2	13	+11
Tuberculosis	79	14	11	3	8	+3
Communicable disease	2,582	784	108	8	100	+676

For county C the records show a net improvement. The number of items that grew better exceeds considerably the number that became worse, but the major proportion of those that improved are among the items pertaining to communicable disease. This trend may be attributed partly to the circumstance that many of the second visits in this county were made to communicable disease cases where the course of the illness is self-limited. As an illustration, a nurse going to put up a placard for scarlet fever might record a number of items on the case as unsatisfactory. When she returns to remove quarantine, the disease has terminated, taking with it those particular unsatisfactory conditions. Consequently, a series of improvements may be recorded for the case.

One must, of course, take into account the fact that some of the items appearing on the records may not yield to a nursing visit, perhaps not immediately, and perhaps not at all. Such physiological conditions as edema or nausea will not necessarily disappear because the patient enthusiastically carries out some hygienic rules of living advocated by the nurse. In such a situation the operation of other factors may be necessary before the nursing visits can be effective.

Still other unsatisfactory conditions are susceptible to change through a nurse's instructions, but not until some rearrangement takes place in the patient's affairs. If a nurse tells a tuberculous patient that the windows in his room should be kept open, the advice can usually be easily followed. But if she tells him that he should

eat more eggs and drink more milk, and he has no money with which to purchase these foods, then he is unable to follow her instructions, and the unsatisfactory condition of lack of proper food will not yield to the nursing visit. Short of advancing the patient an allowance, or inducing the department of welfare to furnish him what he needs, or getting a job for his wife, the nurse is bound to instruct vainly on this point of diet. Many circumstances garnered from actual nursing visits in all parts of the country could be used to illustrate this type of impasse which the nurses so frequently come upon.

In order to allow for these varying factors that interfere with a nurse's success in improving unsatisfactory conditions, the data have been classified into three groups by a committee which included a public health nurse, a physician, a statistician, and the author. The first group comprises those items which should change if the patient acts upon the advice of the nurse. Such things as exercise, exposure to fresh air, or regular eating habits go in this classification. The second group is made up of those physiological conditions which may or may not change as a result of the patient's acting upon the nurse's instructions. The third group covers those conditions for which, in a family of low economic status, a financial change will probably have to precede any other kind of change.

A few items were omitted altogether because of differences of opinion among the judges as to their classification. These are breast feeding, elimination, and medical examination. The items as finally classified are distributed in table 4 according to the changes recorded by the nurse on a second visit.

TABLE 4.—*Recorded changes between first and second visits in conditions originally unsatisfactory, according to their susceptibility to change through nursing instructions*

Classification of recorded items	Number of items unsatisfactory on first visit	Percentage distribution of items unsatisfactory on first visit, according to condition on second visit				
		All unsatisfactory items	Improvement recorded	No change recorded	No observation recorded	Recorded as worse
COUNTY B						
All unsatisfactory items	[1] 1,441	100	34.0	37.3	25.0	3.7
Items directly susceptible to change	848	100	32.8	37.0	26.3	3.9
Items on physical condition not directly susceptible to change	294	100	41.2	30.6	23.8	4.4
Items in which change is limited by economic considerations	299	100	30.4	44.8	22.4	2.4
COUNTY C						
All unsatisfactory items	[1] 3,779	100	31.0	27.3	40.6	1.1
Items directly susceptible to change	2,885	100	27.8	25.0	46.3	0.9
Items on physical condition not directly susceptible to change	644	100	48.8	29.3	20.2	1.7
Items in which change is limited by economic considerations	250	100	22.0	49.2	28.0	0.8

[1] A few items of doubtful classification were omitted.

It will be noted that those items representing physiological conditions show improvement in the largest proportion of unsatisfactory items. The reason for this finding is debatable. One person may maintain that the nurse's teaching undoubtedly contributed to this improvement. Another may point out that, since the majority of patients do not continue to grow worse, one would look for this degree of improvement to come about in the natural course of events. It is highly probable that both factors influenced the change. Be that as it may, a higher degree of improvement is recorded for this group than for those items of habit and behavior among which one would look for the most ready improvement, providing the patients were sufficiently impressed by what the nurse had to offer to try to follow her advice.

The proportion of improved cases is lowest in that group of items in which change is limited by economic conditions.

Table 4, then, offers a choice of inferences. It may be that the nurses do not make sufficiently accurate entries to permit any appraisal of their accomplishments. Or, if the records are exact and fulfill the purpose claimed for them, then it would appear that the nurses influence those items most readily susceptible to their advice no more than they do those less susceptible of improvement.

SUMMARY

The case records of individuals served by nurses of two counties have been analyzed to ascertain whether they reveal changes in health conditions following nursing visits. The results are, of course, limited to the coded entries of "satisfactory" or "unsatisfactory" made for several conditions which the nurses observed and recorded at the time of their first and second visits. The interpretation of the findings is, therefore, dependent upon the accuracy and completeness with which the observed conditions were recorded.

The data reveal that about one-third of the conditions found unsatisfactory on the first visit are recorded as improved at the time of the second visit. About an equal number remain unchanged; a small number of the unsatisfactory conditions grew worse.

Over one-fourth of the situations entered as "unsatisfactory" on the first gradings were omitted in the second gradings. Either the nurses did not observe them on the second visit or forgot them when making out the record. The failure to record the condition for these situations at the time of the second visit prevents the use of this group of items in any estimate of the nurses' accomplishments. It is indicative of a definite weakness in the record-keeping procedure.

The number of satisfactory conditions that became unsatisfactory between the first and second visits almost approximates the number of conditions that improved. When items directly susceptible to change through nursing instructions are selected for a similar analysis, this same ratio holds.

DISCUSSION

A number of factors might account for the fact that no noticeable progress in the recorded conditions shows up in the analysis of these data. The most likely one is that the nurses did not keep their records with sufficient accuracy to make the data actually reflect their accomplishments; or the records may not be designed properly to serve as an index of their achievements. A second likely explanation is that the nurses did bring about changes, but the type of analysis used was not the proper type to uncover these changes. If either of these possibilities is true, and the nurses from these two counties are typical, then the claim that such detailed records can be used to evaluate nursing services has not survived investigation. However, this does not mean that records should be discontinued, but that attention should be focused on keeping more meaningful records.

A third consideration might be that the analysis was limited to the results accomplished between the first and second home calls, whereas only a more intensive service could bring about an appreciable change. In that case, then, the work is characterized by a succession of starts, a large proportion of which are never carried forward to a finish, since in the two counties only 57 percent of the cases were seen more than once.[4] If on investigation this should prove to be the reason for the results shown, then more effective results from the nursing service might be obtained by limiting the number of individuals visited and giving a more intensive service to them.

The fact that the records as analyzed do not reveal that desirable changes took place following a nurse's visit is not presented as condemning nurses' accomplishments when they visit homes. However, the failure of their records to yield evidence of achievement should stimulate administrators to investigate the problem and determine whether the same is true for their own service, and, if so, to ascertain what steps should be taken to improve the situation.

[4] The proportions of cases given only one visit in the two counties were 67 percent in county B and 34 percent in county C. The proportions visited twice were 16 percent and 49 percent, respectively.

HISTOPATHOLOGICAL CHANGES IN MICE INOCULATED WITH INFLUENZA VIRUS[1]

By A. A. Nelson, *Associate Medical Pathologist*, and J. W. Oliphant, *Passed Assistant Surgeon, United States Public Health Service*

Smith, Andrewes, and Laidlaw (*1*), in 1933, succeeded in serially passing through ferrets, with the development of nonfatal nasal and pulmonary lesions, a virus from human cases of influenza. In 1934 they (*2*) were able to use mice for passage of the virus; in this animal pulmonary but not nasal lesions were produced, and were often fatal. Francis (*3*) reported similar results. The papers of these workers give only short descriptions of the histopathological changes in mice. Because of the increasing use of mice in the study of influenza virus it was felt that a more detailed description would be of value.

PREVIOUSLY REPORTED PATHOLOGICAL CHANGES IN MICE INOCULATED WITH INFLUENZA VIRUS

Andrewes, Laidlaw, and Smith (*2*) found the only constant postmortem changes in the lungs; in mice dying from infection the lungs were deep red and almost airless except for small emphysematous areas at the periphery, and usually all lobes were affected. In mice killed 3 to 6 days after infection all degrees of involvement were seen. The lesions consisted of areas of plum-colored consolidation, often with ill-defined margins. On section a good deal of fluid exuded from the cut surface. The upper dorsal portions of the lungs were most frequently attacked, and areas of hepatization could be seen apparently spreading out from the lung roots. In other mice only a tip of a lobe would be attacked, or there would be dusky red spots from 1 to 2 mm. in diameter. A strictly lobar distribution was unusual. Histologically, the larger bronchi contained desquamated epithelial cells and leucocytes with pyknotic nuclei. There was some edema and leucocytic infiltration around the bronchioles and blood vessels. The alveoli contained fluid and sometimes fibrin, red cells, and leucocytes. In stained smears there could be seen many polymorphonuclear leucocytes with pyknotic nuclei and mononuclear cells with vacuolated cytoplasm. Francis (*3*) noted a bluish gray or grayish red consolidation, spreading peripherally; microscopically there were edema, thickening of alveolar walls, perivascular small round cell infiltration, and variable numbers of polymorphonuclear leucocytes.

McIntosh and Selbie (*4*) stated briefly that in animals (mice and ferrets) dead as a result of inoculation the lungs grossly showed large areas of collapse and hemorrhage, and microscopically a great increase of mononuclear cells in the alveolar walls. In some animals the liver was fatty.

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[1] From the Division of Pathology and the Division of Infectious Diseases, National Institute of Health.

Dal (*5*) found that mice infected intranasally or by inhalation with influenza virus showed a progressive destruction of the bronchial epithelium, disturbed blood circulation, and inflammation of the pulmonary tissue with hemorrhages, edema, and destruction of vascular walls. At the time of death of the animal most of the bronchial epithelium was destroyed, so that the process might be characterized as a destructive necrotizing endobronchitis and endobronchiolitis. This destruction of large portions of the bronchial epithelium was stated by Straub (*6*) to be the most conspicuous feature of the process in mice dying from influenza virus infection. The terminal and respiratory bronchioles were denuded of epithelium, widely dilated, and empty; the alveoli were collapsed and partly filled with edema fluid, and the alveolar capillaries were congested. Another conspicuous feature was peribronchiolar edema. Straub stated that polymorphonuclear infiltration was totally absent or present to a very slight extent only, and if present was always the effect of a secondary inflammatory process occurring in the diseased parts of the lung. In mice that survived infection a reparative proliferation of epithelium, beginning in the terminal bronchioles and extending into the alveoli, was seen.

Barberis (*7*) examined 31 mice inoculated with influenza virus, and found all forms of acute pulmonary inflammation, from congestion to hepatization. All animals showed a bronchitis, and the more severely involved ones a bronchopneumonia, with an exudate of fibrin, red cells, polymorphonuclears and lymphocytes, or even a lobar pneumonia. In addition, varying degrees of interstitial involvement were seen.

Rickard and Francis (*8*), by giving enormous doses of virus intraperitoneally, succeeded in producing nonfatal pulmonary lesions in some of their mice; the histopathology is not given.

Of these papers, only those of Dal, Barberis, and Straub give histopathological findings in any detail; the first paper was published in Russian and the second in Italian. Straub's paper contains excellent microphotographs.

MATERIAL AND METHODS

In this study there were examined 115 white Swiss mice of about 15 grams weight; 73 of these had been inoculated by a variety of routes with the PR8 strain (*3*) of human influenza virus (originally obtained from Dr. Thomas Francis, Jr., of the Rockefeller Institute) concurrently maintained by serial passage through these and other similar mice, and the remaining 42 mice served as controls. The control mice were given either the saline (used in the earlier part of the study) or broth vehicle alone, or this plus noninfected lung, or given light ether anesthesia alone and not inoculated. The numbers

of mice in the various groups and the time at which they were examined are given in the following table.

Time examined	Test animals			Control animals		
	Intranasal	Conjunctival	Intraperitoneal	Intranasal	Conjunctival	Intraperitoneal
2–5 hours	4					
18–24 hours	4			3		
2 days	8	1	1	5	1	1
3 days	12	1	1	5	1	1
4 days	14	1	1	16	1	1
5–6 days	5					
7–8 days	1	1	3	1	1	1
10–12 days	2	3	1		1	1
18–23 days	5	1	1		1	1
45–47 days	2					
Totals	57	8	8	30	6	6
	73			42		
	115					

The potency of the virus used was such that 0.03 to 0.05 cc. of a 1:10 to 1:50 suspension of infected lung in broth, inoculated intranasally under light ether anesthesia, would kill 80 percent or 90 percent of the mice in 3 to 6 days; a saline suspension of virus was not as potent. When the virus was inoculated by other routes, mice did not appear sick and no fatalities resulted.

The fact that the influenza virus was the lethal agent for the mice was shown by repeated protection tests with immune sera from rabbits; some of the sera were obtained from Dr. R. R. Hyde, of the School of Hygiene of Johns Hopkins University, and some were from our own Institute. A mixture of immune rabbit serum and virus, incubated for an hour, would uniformly protect mice, while a mixture of normal rabbit serum and virus, similarly incubated, would not protect.

Cultures of the lungs of dead animals on blood agar slants were sometimes sterile and sometimes showed varying organisms. No one type was regularly found; none resembled *H. influenzae*.

In tissue sections it was difficult to find bacteria, either with the routine hematoxylin-eosin-methylene blue stain, which shows them well, or with Gram's stain. Such few as were seen, either in the alveoli or bronchi, or in the bronchial exudate, were chiefly short Gram-negative bacilli. The control animals showed about as many bacteria as did those treated with virus. The exceptions as regards bacteria were 3 of the 57 mice receiving intranasal inoculations of virus; 2 of these died at 5 days and 1 at 3 days; microscopically, the lungs differed from all the other animals in showing large patches of predominantly polymorphonuclear exudation in addition to changes attributable to the virus; in these areas of polymorphonuclear exudation were numer-

ous bacteria of a variety of forms. It may be assumed that these cases represented superimposed bacterial infection of a virus-damaged lung, as no cases were seen in the intranasally inoculated control mice.

Most of the animals studied had been killed with ether and only a few minutes had elapsed before the tissues were put into the fixative (Orth's solution); the mice also inhaled the fixative while anesthetized. In fatal cases, animals were used for study only if they had been dead less than 3 hours. Sections were stained routinely by a hematoxylin-eosin-methylene blue technique, and with either a van Gieson or Gallego stain; the latter is especially good for mucin, elastic tissue, and mast cells. Sections of noses were made transversely in some animals and longitudinally in others.

INTRANASAL INOCULATION

Two hours and 5 hours.—Two mice killed 2 hours after inoculation showed no gross or microscopic lesions in the lungs and trachea; the respiratory and olfactory epithelia of the nose were both normal. Of 2 mice killed at 5 hours, one showed the same findings as the mice killed after 2 hours, and the other showed in about one-third of one lobe a slight excess of polymorphonuclear and mononuclear leucocytes in the alveolar walls and alveoli; on the anterior wall of the midportion of the trachea there were a few small subepithelial collections of similar leucocytes, with infiltration of the epithelium. The respiratory and olfactory mucosae of the nose were normal. Neither of the animals killed after 5 hours showed gross lesions.

Eighteen hours and 24 hours.—At this time the first definite histological lesion appeared; grossly the lungs were negative from the exterior aspect (lungs were not sectioned before fixation). All 4 animals in this group showed a focal purulent bronchitis, with cellular exudation into the immediately adjacent alveoli, and slight but definite damage to the bronchial epithelium (figs. 1 and 2). The cellular exudate in the bronchi and alveoli was chiefly polymorphonuclear. The epithelial damage consisted of slight leucocytic infiltration, irregularity in height of the cells, vacuolation of cytoplasm with or without the presence of spherical oxyphilic hyaline bodies in the vacuoles, and various stages of coagulation necrosis of scattered individual cells, or small clumps, with nuclear pyknosis and fragmentation. Except for the polymorphonuclear exudation into the peribronchial alveoli, the parenchyma was essentially normal; there was a slight increase of polymorphonuclears in the alveolar capillaries, but no mononuclear interstitial infiltration and no alveolar exudate. Around a few bronchi slight edema and polymorphonuclear and mononuclear leucocyte infiltration were seen, and occasional bronchi showed a few polymorphonuclears within the wall. The changes in

the tracheal epithelium were similar to those in the bronchi but were less in degree. Respiratory and olfactory nasal mucosae were normal. Lesions in organs other than those of the respiratory tract will be considered separately at the end of this section.

Two days.—The 8 mice in this group showed a quite uniform picture. Essentially, there was the same focal acute bronchitis as was present at 1 day, but with more necrosis of the exudate cells and more damage to the epithelium; in addition, an interstitial exudate began to appear. The bronchi, instead of being stuffed with viable polymorphonuclears, began to show a layer of necrotic leucocytes and debris plastered against the epithelium (fig. 3). The epithelium was damaged in the same fashion as described for the 1-day stage, to a greater degree but still not severely; the damage was greatest in the larger bronchi, and some of the bronchioles were relatively uninvolved. Perivascular edema, with small to moderate numbers of polymorphonuclears, lymphocytes, and small macrophages [2] in the perivascular spaces, was now rather prominent. There was a moderate focal peribronchial accumulation of similar cells, but here the polymorphonuclears were fewer. The tracheal changes were similar to those in the bronchi, but were less marked. The lung parenchyma was for the most part practically normal, but patches of slight septal infiltration with small mononuclear cells and fewer polymorphonuclears were seen. A few alveoli contained edema fluid. Grossly the lungs at this stage showed little change; some showed congestion or one or two small dark red spots; they did not appear grossly edematous. In 3 of the 8 mice the noses were examined; the respiratory and olfactory epithelia were normal in all, but 2 of the 3 showed a slight to moderate infiltration of the lamina propria with lymphocytes and fewer polymorphonuclears.

Three days.—The bronchial exudate, bronchial epithelial damage, peribronchial cellular infiltration, perivascular edema and cellular infiltration, and tracheal changes were about the same as at 2 days, with some accentuation. Four of the 12 mice in this group showed no marked further changes; the other 8 showed in varying degrees two new factors—a diffuse edema and a diffuse interstitial (alveolar septal) exudate (figs. 4 and 5), in which small mononuclear cells predominated; small lymphocytes and small macrophages each made up about one-third of the exudate and polymorphonuclears the other

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[2] We do not wish to go into a discussion of the genetic relationships of the various cells in mouse lung exudate. For practical purposes they can be divided into 4 common types and 2 less frequent types. Polymorphonuclear leucocytes, small lymphocytes, and large macrophages are easily enough identified and give no trouble; the fourth chief type is more difficult to classify and consists of cells of the size of a small lymphocyte to considerably larger, with an oval or reniform nucleus containing chromatin particles not as heavy as in the small lymphocyte, and cytoplasm which varies in amount and character. This fourth type appears in a variety of forms suggesting transitions to the large macrophage, and is for convenience called a small macrophage; also for convenience we have grouped together the small lymphocytes and small macrophages as small mononuclear cells. Plasma cells and large lymphocytes are less frequently seen than are the previous 4 groups, and mast cells are rare.

FIGURE 1.—14589. 1 day. Small peribronchiolar alveolar focus of polymorphonuclears, few polymorphonuclears in bronchiole. Note absence of septal and peribronchiolar, with early perivascular, cellular infiltration. Iron hematoxylin-van Gieson. × 80.

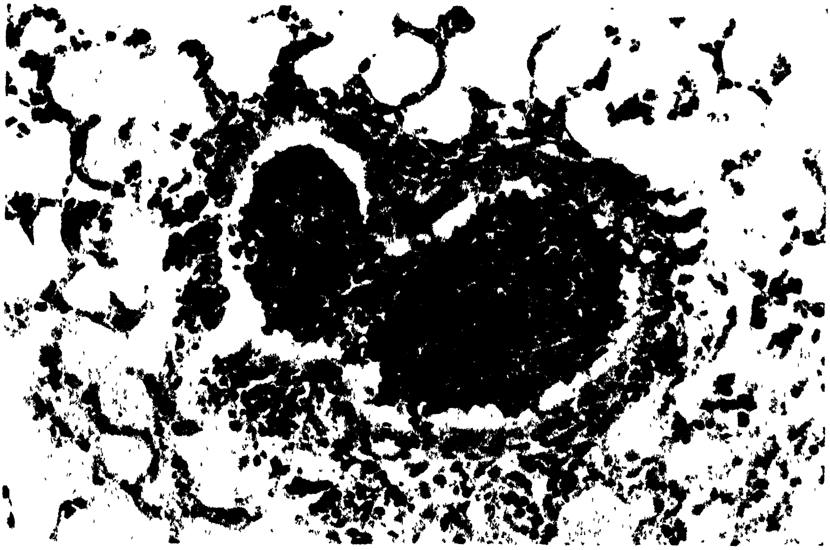

FIGURE 2.—14589 1 day. Bronchiole filled with viable polymorphonuclears; epithelium only slightly damaged. No peribronchiolar or septal cellular infiltration. Iron hematoxylin-van Gieson. × 250.

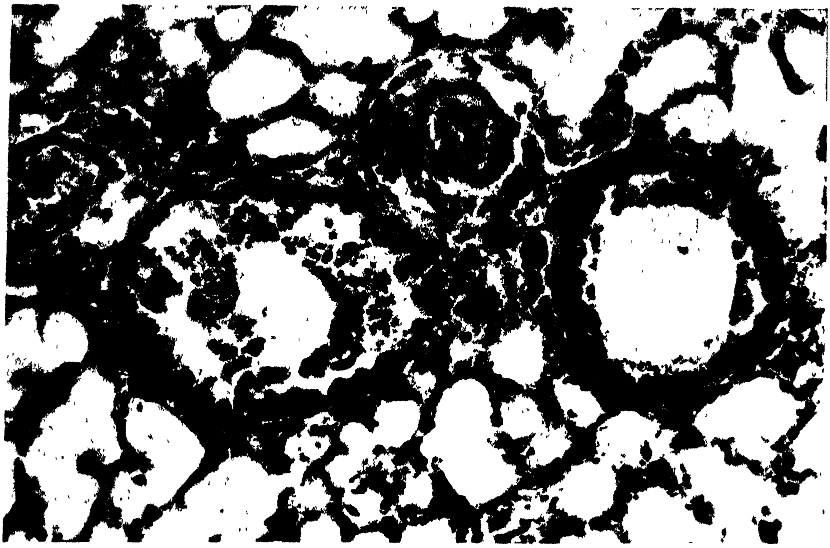

FIGURE 3.—14910 2 days Bronchiolar polymorphonuclear exudate is now largely necrotic and there is definite damage to the epithelium. Some perivascular, but very little peribronchiolar or septal cellular, infiltration. Iron hematoxylin-van Gieson. X 250.

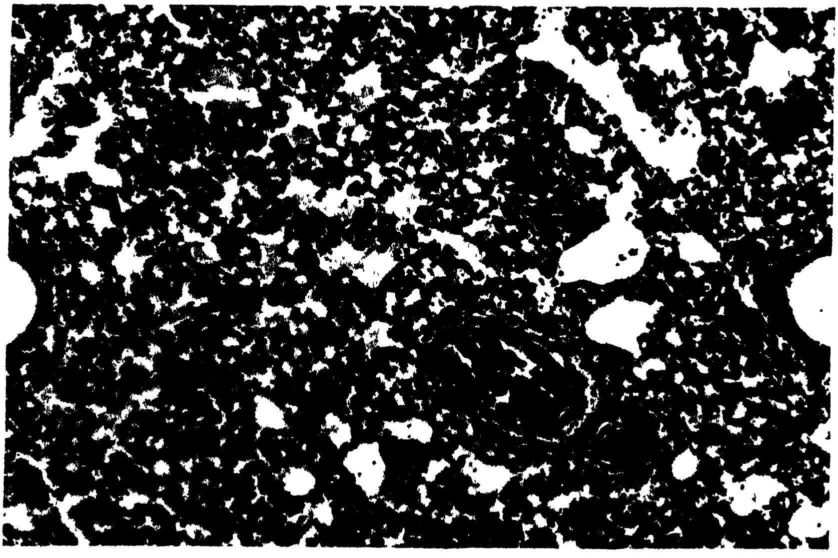

FIGURE 4.—14444. 3 days. Diffuse septal cellular infiltration; edema fluid in alveoli Hematoxylin-eosin-methylene blue. X 80.

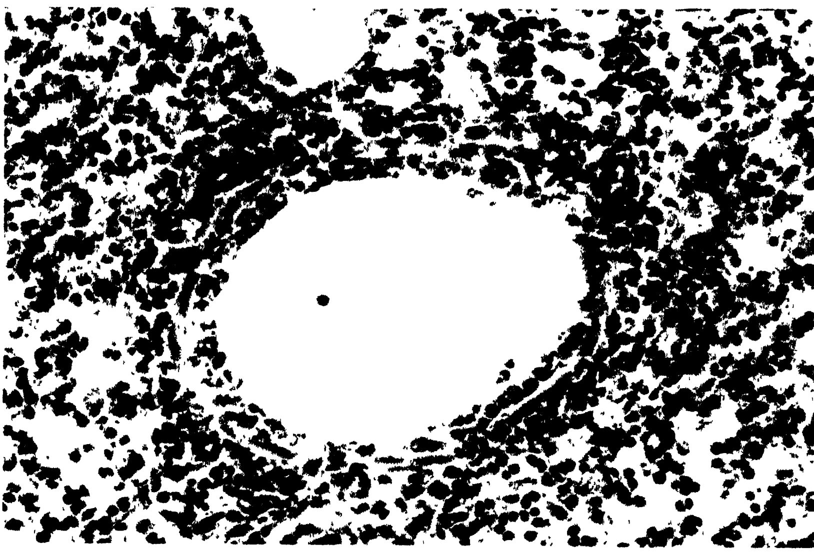

FIGURE 5.—11444. 3 days. Septal and peribronchial cellular infiltration, largely mononuclear Small amount of necrotic exudate among and lying against epithelium; epithelium is markedly damaged and is denuded in spots. Edema fluid present but difficult to show with this stain. Iron hematoxylin-van Gieson. X 250.

FIGURE 6.—15724. 4 days. Septal, peribronchial, and perivascular cellular infiltration, chiefly mononuclear. Bronchus shows proliferation of epithelium and a tendency to squamous metaplasia. Note nuclear fragments among epithelial cells. Edema fluid present but difficult to show with this stain. Iron hematoxylin-van Gieson. X 135.

FIGURE 7.—14935. 4 days. Moderate squamous metaplasia of tracheal epithelium Cilia are shown on a cell near the center of the photograph. Hematoxylin-eosin-methylene blue. × 900.

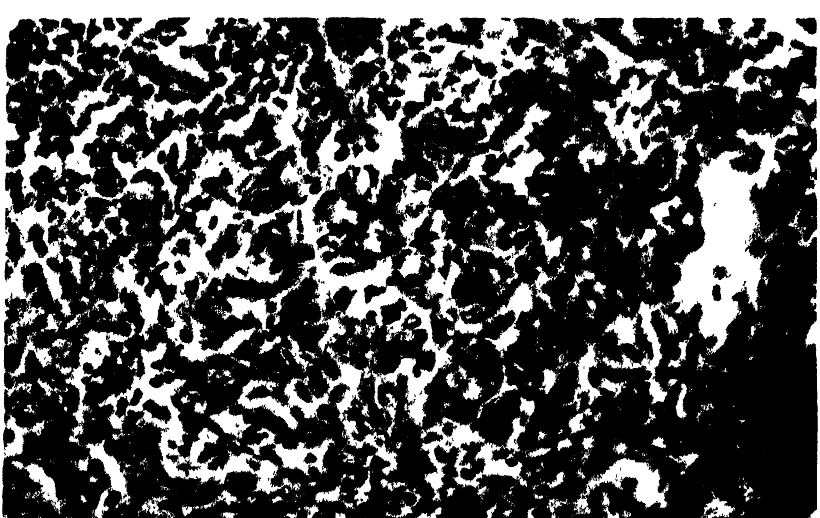

FIGURE 8.—15768. 18 days. Marked filling of alveoli with squamous epithelial cells. Iron hematoxylin-van Gieson. × 250.

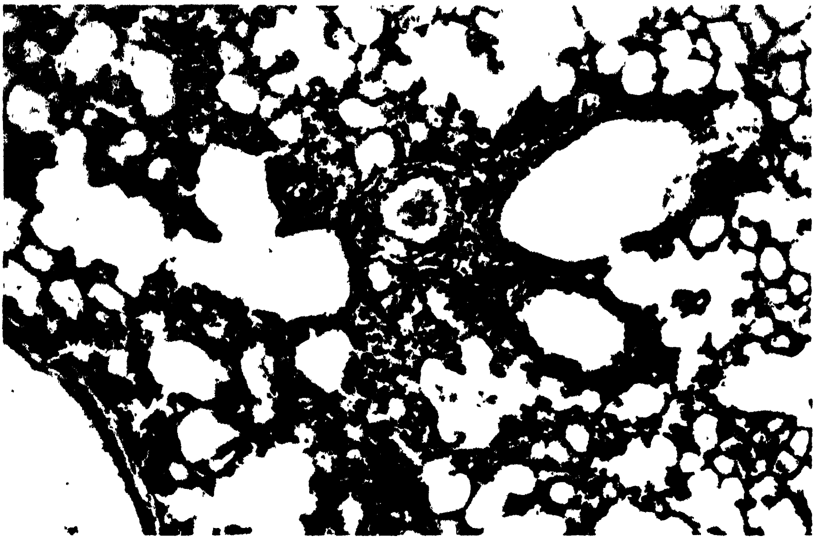

FIGURE 9.—15763 18 days Persistence of low and irregular epithelium in bronchi Focal interstitial pneumonia. Iron hematoxylin-van Gieson × 80

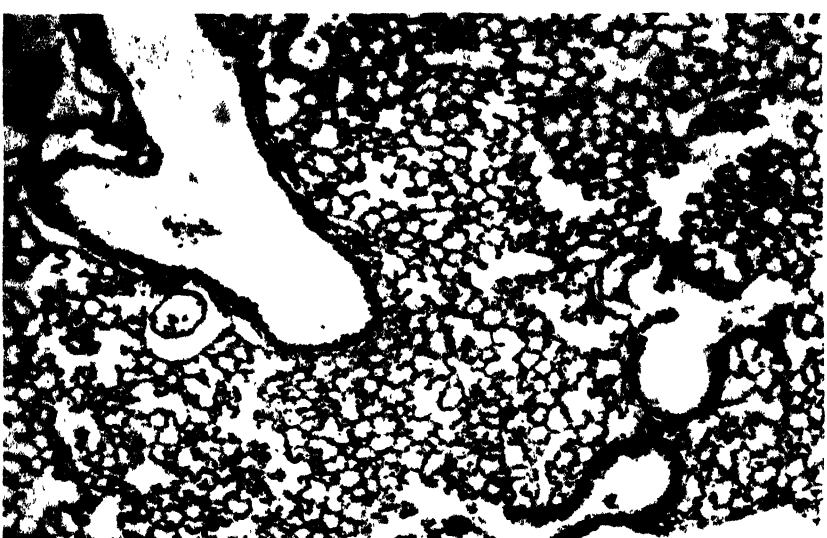

FIGURE 10.—15731. 3 days. Control animal given suspension of noninfected lung in broth intranasally Normal lung. Iron hematoxylin-van Gieson. × 80.

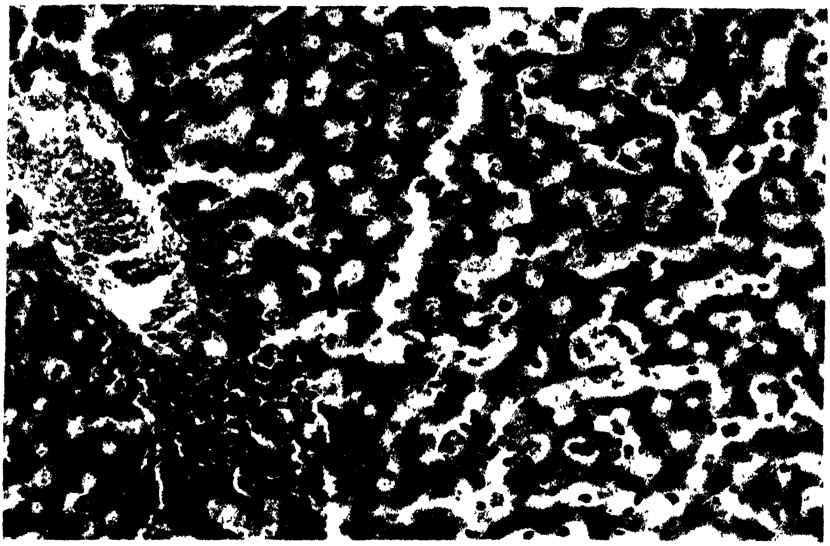

FIGURE 11.—15083. 4 days. Slight diffuse increase of small mononuclear cells in sinusoids of liver, focus of these cells around a central vein. Iron hematoxylin-van Gieson × 250

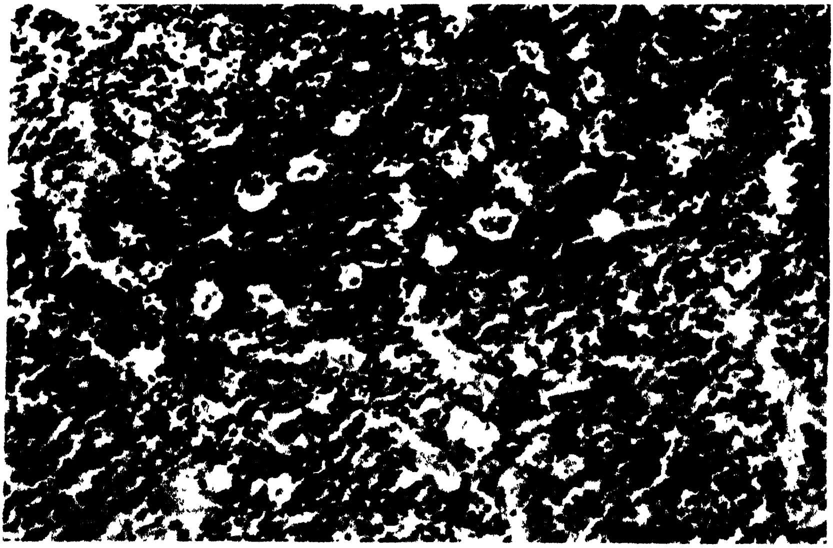

FIGURE 12.—15248. 4 days. Thymus Reticulum cells of cortex (above) hyperplastic and contain numerous nuclear fragments. Iron hematoxylin-van Gieson. × 250.

one-third. Large macrophages were not increased (a variable number of small and large macrophages are seen in a normal young mouse lung). The most advanced processes in this group, in mice that had died at 3 days, represented the full-blown stage of the lung lesion caused by influenza virus, and will be described later in more detail. Grossly, the lungs of the 3-day mice usually showed consolidation, ranging from a few small spots to most of a single lobe to almost complete involvement of both lungs. The consolidation was of a dark or bluish red color and had a wet, gelatinous appearance. The peripheral portions of the lungs were least involved. Much fluid exuded on cutting the more consolidated lungs. Clinically the mice began to be cyanotic and to breathe deeply and spasmodically; this was evidently a result of the mechanical blockage of the aerating surfaces of the lung by the edema fluid, and this mechanical asphyxia probably played a large part in killing the mice. The noses of 8 of the 12 mice were examined; none showed any damage to the epithelium; in 2 there was slight polymorphonuclear and lymphocyte infiltration in the lamina propria, with fewer leucocytes in the epithelium; in 1 the nasal cavity contained a moderate amount of oxyphilic hyaline and granular material in which were a few mononuclear leucocytes and a moderate number of nuclear fragments.

Four days.—Most deaths among intranasally inoculated mice occurred on this day, with cyanosis, labored deep breathing, apathy, and anorexia. The lungs, except for an emphysematous zone ½ to 1 mm. in width along the margins, were dark or bluish red and had a wet, gelatinous appearance; on section much fluid exuded. Under a low magnification some air bubbles could be seen to be still present in the consolidated lung. Fourteen animals were examined microscopically at this stage; most had died or would shortly have died from the effects of the virus. There was a diffuse edema and hyperemia, and a diffuse moderate infiltration of the alveolar septa with about equal parts of small mononuclear cells, large macrophages (the latter had increased in number from the 3-day stage) and polymorphonuclears; a small percentage of the exudate cells were necrotic. The edema fluid sometimes contained so little protein that it was difficult to make out, but usually it could be easily seen. Perivascular edema was present, as was perivascular and peribronchial infiltration of moderate degree, with the same type of cellular exudate as in the interalveolar septa. The bronchial epithelial damage was more marked than on the second and third days. There were now multiple small areas where it was completely denuded; the remaining epithelium was infiltrated by leucocytes and moderately to markedly flattened, with individual epithelial cells in varying stages of necrosis. It was covered by an irregular thin layer of necrotic cellular exudate and fewer desquamated epithelial cells. Some bronchioles were filled

with necrotic cellular exudate. A few bronchi showed proliferation rather than reduction in amount of epithelium (fig. 6). In the earlier stages the larger bronchi had shown the most epithelial damage; now it was the smaller bronchi and bronchioles, although in the large bronchi damage was quite marked, and greater than in the trachea, where the epithelium did not reach the point of becoming denuded. Frequently a slight tendency to squamous metaplasia of the epithelium was noted in the bronchi (fig. 6) and occasionally in the trachea (fig. 7). Cellular infiltration in the trachea was in the lamina propria and not perimuscular as in the bronchi. The pleura often showed slight leucocytic infiltration and slight heaping and rounding of the mesothelial cells.

The noses of 12 of these 14 mice were examined. The respiratory and olfactory epithelia were normal in all. One mouse showed a few small foci of polymorphonuclear infiltration in the lamina propria of the septum, and another a moderate amount of oxyphilic amorphous material containing a few leucocytic fragments in the nasal cavity.

Five and 6 days.—Two mice dying at 5 days had a superimposed bacterial infection, as described in the section on material and methods. Three mice dying at 6 days showed lungs practically identical with those dying at 4 days and described in the above paragraph.

Over 6 days.—Clinically, the 10 or 20 percent of intranasally inoculated mice not dying after 6 days showed the same symptoms (dyspnea, apathy, cyanosis) as those fatally involved, but to a lesser degree. The symptoms gradually disappeared and most of these animals would live indefinitely thereafter. It was not a primary purpose of this study to follow this group and determine what secondary changes took place; however, 10 mice were studied at various intervals. One examined at 8 days differed only in degree from those dying at 4 days. Two mice examined at 12 days, 3 at 18 days, and 2 at 23 days were strikingly different; pneumonic involvement was now patchy and the degree of consolidation greater where present. All of these lungs showed from small to large areas of squamous metaplasia of the alveolar epithelium (fig. 8); sometimes the alveoli were solidly filled and sometimes simply lined by squamous cells, with a little leucocytic debris in the center. Some of these animals had bronchi stuffed with polymorphonuclears, while others had very few. The bronchial epithelium in some areas appeared normal, while in other areas it was slightly to markedly flattened and irregular (fig. 9); this change did not appear related to the presence of cellular exudate within the bronchus or to the presence of pneumonia in the vicinity. It appeared as if the epithelium had in the acute stage of infection received an injury from which it could not completely recover. Two mice examined at 45 days showed focal pneumonic involvement similar to that

just described but considerably less in extent, suggesting that eventually the residual infection might practically disappear.

Respiratory tract in control mice.—Thirty mice were given, under light ether anesthesia similar to that given the test mice, similar intranasal doses of broth or saline solution; some doses did and some did not contain normal mouse lung in the same proportion as those given to the test animals. One group of 5 mice was given ether alone. Stated briefly, lesions were absent in 23 of the 30 mice (fig. 10); in the remaining 7 they were very minor when compared with those in the test animals. One 2-day mouse, one 3-day mouse, and five 4-day mice showed one or more of the following changes: Slight focal septal infiltration with mononuclear and polymorphonuclear leucocytes, slight (in 1 case focally marked) peribronchial and perivascular infiltration with chiefly mononuclear cells, or occasional very small foci of polymorphonuclear exudation into alveoli. Only 1 of the 7 mice showed any damage to the bronchial epithelium; this was in a small area of bronchopneumonia, and this mouse was also the only one showing any cellular exudate in the bronchial lumina. One mouse showed an occasional polymorphonuclear among the tracheal and bronchial epithelial cells; the tracheas, except for this, were negative. No edema was seen in any of the controls, and grossly they all appeared normal. Respiratory and olfactory epithelia were examined in 18 of the 30, and all were negative.

Organs other than respiratory tract.—In general, slight lesions probably attributable to the virus could be made out in the liver, spleen, thymus, and kidney, with none in the adrenal, brain, thyroid, heart, pancreas, or gastrointestinal tract. Organs were examined in the following numbers of animals in the intranasally inoculated group.

Organ	Test	Control	Organ	Test	Control
Heart	Nearly all	Nearly all	Brain	19	17
Liver	29	26	Thymus	8	8
Spleen	30	26	Thyroid	6	----------
Pancreas	17	14	Small intestine	6	----------
Kidney	22	15	Esophagus	5	----------
Adrenal	17	11			

The liver in 13 of the 29 test animals in which it was examined showed a slight or moderate increase in the number of small mononuclear cells in the sinusoids and portal spaces and around the central veins (fig. 11); polymorphonuclears were less increased in number. This change was present in only 4 of the livers of the 26 control mice examined. The spleen showed no variation in size between test and control animals; microscopically the only difference was that in the test animals the follicles contained moderate to large numbers of nuclear fragments while in the controls there were small to moderate

numbers. In both the follicles were large to very large, with indistinct germinal centers; there were small to moderate numbers of myeloid cells, slight to moderate peritrabecular hyperplasia, and no hemosiderosis. The thymus showed a distinct difference between test and control animals; in the former 2 thymuses showed slight and 4 moderate reticulum cell hyperplasia, with corresponding numbers of nuclear fragments in and around the reticulum cells (fig. 12); none of the control animals showed these changes. The kidneys of 3 test mice showed slight focal fatty change and those of 2 other test mice showed slight focal hyaline granular change in the convoluted tubular epithelium; none of the control animals showed this change. The kidneys of 2 test and 3 control mice showed slight focal interstitial infiltration with small mononuclear cells. The brain sections in both control and test animals were uniformly entirely normal; no encephalitic or meningitic lesions of any kind were present.

INOCULATIONS BY OTHER ROUTES

It is well known that influenza virus given in any way except directly into the air passages does not cause fatal lesions in mice, and only by using enormous doses (*8*) are gross pulmonary lesions caused at all; however, it was decided to see what histopathological changes might occur after conjunctival and intraperitoneal inoculation of the virus.

Conjunctival inoculation.—A dose of 0.03 cc. of a suspension similar to that used in the nose was dropped into the conjunctival sacs; control animals were given the broth vehicle only. All 6 control animals and the 2-, 3-, 4-, and 7-day test animals showed no lesions. At 10 days, 1 mouse was negative and 2 others showed moderate focal interstitial, peribronchial, and perivascular infiltration with mononuclear cells predominating. A few alveoli contained edema fluid. One mouse examined at 22 days showed similar cellular infiltration. There was no damage to the respiratory epithelium (bronchi, trachea, nose) in any of these mice. In one of the 10-day mice with lung lesions the heart showed a few myocardial and subendothelial foci of lymphoid cells and macrophages up to $50 \times 100\mu$, a rather unusual finding. Spleens were examined only on the three 10-day test animals, and showed nothing of note beyond moderately active centers in the follicles. Sections of brains were examined in all test and control animals, and the orbits in most; no lesions could be seen.

Intraperitoneal inoculation.—Doses of 0.5 cc. of a suspension similar to that used in the nose were injected into the peritoneal cavity; control animals were given the broth vehicle. All of the test and control animals, except the 2-day control mouse, showed lesions consisting of slight to moderate focal peribronchial and perivascular infiltration,

chiefly with mononuclear cells, and slight focal or diffuse septal infiltration with mononuclears and polymorphonuclears. The tracheal epithelium was normal; the lamina propia showed slight to moderate focal infiltration, chiefly with mononuclear cells. In one of the 8-day test animals there was slight damage to the bronchial epithelium. None showed edema. The lesions were more marked in the test animals, but there was no great difference; possibly their production was related chiefly to the relatively large amount of inoculum used. Nasal epithelium and brain were examined in all of these animals and showed no lesions.

SUMMARY

Intranasal instillation of the PR8 strain of influenza virus, as carried on in this study, produced in mice an edematous pneumonic process which was fatal in about 4 days in 80 to 90 percent of the mice. Study of 57 test mice showed that, in general, at 1 day after inoculation there was a focal polymorphonuclear exudation in the smaller bronchi, and a few small peribronchial alveolar foci of polymorphonuclears; there was an early stage of damage to the bronchial epithelium, and practically no septal infiltration. At 2 days the process was not much greater in extent, but the polymorphonuclear exudate was in large part necrotic, and damage to the bronchial epithelium was greater; perivascular edema and peribronchial and perivascular infiltration, chiefly with small mononuclear cells, were appearing. At 3 days to 4 days, when the animals began to appear ill, a diffuse edema appeared, together with a slight to moderate diffuse septal and alveolar infiltration with an exudate of about two-thirds small mononuclear cells and one-third polymorphonuclears; the bronchial epithelial damage had progressed to the point where small areas were denuded, and there was more peribronchial and perivascular cellular infiltration. Animals not dying within 3 to 6 days nearly always lived indefinitely thereafter, with persisting clinical symptoms and varying degrees of chronic pneumonic processes; squamous epithelial metaplasia in the alveoli was a prominent feature and bronchial epithelial damage persisted. The changes in the trachea were similar to those in the bronchi but less marked. Of 30 control animals, 23 showed no lesions and in the remaining 7 there were very minor lesions as compared to those in the test animals.

The noses of 26 test animals were examined; the respiratory and olfactory epithelia showed no lesions in any; in 5 mice there was slight focal mononuclear and polymorphonuclear infiltration of the lamina propria of the mucosa; the noses of 18 control mice showed no lesions. Slight lesions were present in the liver, spleen, thymus, and kidney in the test animals, with none in the adrenal, brain, thyroid, heart,

pancreas, or gastrointestinal tract. Small series of mice given conjunctival or intraperitoneal inoculations of virus showed more lesions than did control animals, although these additional lesions were slight and in no case were the animals ill.

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THE MAJOR CAUSES OF DEATH, INCREASE IN LIFE EXPECTANCY, AND POPULATION CHANGES IN THE UNITED STATES

According to figures furnished by the Bureau of the Census,[1] nine causes, including groups of closely related causes, accounted for almost three-fourths (72 percent) of all deaths in the United States in 1937. This fact has considerable medical and public health significance, as it draws the line of battle for a concerted and intensified attack against diseases and conditions which challenge curative and preventive medicine and to which greater attention should be given.

In addition to the number and percent of all deaths among all ages attributed to the nine leading causes, figures are given in table 1 for the nine most important causes of death by broad age groups from infancy (under 1 year) to advanced age. From these figures it is apparent that the relative importance of different diseases from the standpoint of mortality varies greatly at different age periods during the span of life. It will be noted that "influenza and pneumonia" stands high in the list for all age groups except old age and causes the largest percentage of deaths in the age groups 1–4 and 5–19. Heart disease is the most important cause of death numerically for all ages, for the adult age groups (20–59 years), and for the old age group (60

[1] The Killers. Vital Statistics, Special Reports, vol. 7, No. 50, September 18, 1939.

years and over). Diarrhea and enteritis, whooping cough, and diphtheria still take too large a toll of lives in the childhood group, in view of the progress made in the control of these diseases, while congenital malformations and diseases of early infancy cause more than 51 percent of the deaths under 1 year of age, emphasizing the necessity for greater efforts in making childbirth safer for the baby as well as in the preservation of infant lives.

TABLE 1.—*Number and percent of deaths from the principal causes, by broad age groups, United States, 1937*

Cause of death	All ages: Number	All ages: Percent
All causes	1,450,427	100.0
Diseases of the heart	346,401	23.9
Influenza and pneumonia (all forms)	148,014	10.2
Cancers and other malignant tumors	144,774	10.0
Nephritis	102,877	7.1
Cerebral hemorrhage and softening	99,577	6.9
Tuberculosis (all forms)	69,324	4.8
Congenital malformations and diseases of early infancy	63,349	4.4
Motor-vehicle accidents	39,643	2.7
Diabetes mellitus	30,587	2.1
Other causes	405,881	28.0
	Infant mortality (under 1 year)	
All causes	119,931	100.0
Congenital malformations and diseases of early infancy	61,676	51.4
Influenza and pneumonia (all forms)	20,286	16.9
Diarrhea and enteritis (under 2 years)	11,672	9.7
Whooping cough	3,171	2.6
Syphilis	1,522	1.3
Diseases of thymus gland	1,140	1.0
Dysentery	1,074	.9
Accidental mechanical suffocation	970	.8
Hernia, intestinal obstruction	958	.8
Other causes	17,467	14.6
	Childhood (1-4 years)	
All causes	34,392	100.0
Influenza and pneumonia (all forms)	9,236	26.9
Diarrhea and enteritis (under 2 years)	2,734	7.9
Whooping cough	1,638	4.8
Diphtheria	1,397	4.1
Tuberculosis (all forms)	1,303	3.8
Accidental burns (except conflagration)	1,173	3.4
Diarrhea and enteritis (2 years and over)	1,145	3.3
Motor-vehicle accidents	1,137	3.3
Congenital malformations and diseases of early infancy	759	2.2
Other causes	13,870	40.3

Cause of death	Youth (5-19 years): Number	Youth (5-19 years): Percent
All causes	58,519	100.0
Influenza and pneumonia (all forms)	7,374	12.6
Motor-vehicle accidents	6,381	10.9
Tuberculosis (all forms)	5,635	9.6
Appendicitis	3,959	6.8
Diseases of the heart	3,735	6.4
Drowning	2,528	4.3
Puerperal state	1,353	2.3
Nephritis	1,304	2.2
Fall (accidental)	1,201	2.1
Other causes	25,049	42.8
	Adult (20-59 years)	
All causes	508,806	100.0
Diseases of the heart	95,121	18.7
Cancers and other malignant tumors	55,872	11.0
Influenza and pneumonia (all forms)	52,493	10.3
Tuberculosis (all forms)	50,645	10.0
Nephritis	28,939	5.7
Cerebral hemorrhage and softening	24,309	4.8
Motor-vehicle accidents	23,313	4.6
Suicide	14,196	2.8
Puerperal state	9,410	1.8
Other causes	154,508	30.4
	Old age (60 years and over)	
All causes	727,668	100.0
Diseases of the heart	246,570	33.9
Cancers and other malignant tumors	87,453	12.0
Cerebral hemorrhage and softening	74,754	10.3
Nephritis	72,042	9.9
Influenza and pneumonia (all forms)	58,506	8.0
Arteriosclerosis (except coronary arteries)	20,585	2.8
Diabetes mellitus	20,550	2.8
Fall (accidental)	17,743	2.4
Tuberculosis (all forms)	11,061	1.5
Other causes	118,404	16.3

In contrast, and as is well known, diseases of the heart, cancer, nephritis, and diabetes mellitus are less important causes of death at the younger ages than during the adult and advanced age periods. Tuberculosis is an important cause of death in every age except infancy and motor-vehicle accidents in every age period given except the youngest and oldest, standing highest during the period of youth, 5–19 years.

Dr. W. Thurber Fales, Director of the Bureau of Vital Statistics of the Baltimore City Health Department, has suggested [2] that a narrower age grouping would bring out important mortality facts better with reference to certain periods of life, and he proposes 7 age groups based on changes in activity and environment, as follows:

Under 1 year (infancy).
1–4 years (early childhood, preschool).
5–14 years (childhood, school).
15–24 years (adolescent and early adult (entrance into industry and beginning of childbearing period)).
25–44 years (adult, childbearing and most active production period).
45–64 years (middle age).
65 and over (old age).

Doctor Fales believes that this grouping, in terms of certain natural periods of the life span, would be of value to public health programs, as the narrower age groups have distinct distributions of causes of sickness and mortality, and programs of education and prevention could be more effectively directed to the important causes and to persons in the age classifications grouped according to activity, environment, and biological functions. Table 2, furnished by Doctor Fales, presents the 1937 mortality data for certain principal causes by the narrower age classes, and shows, by comparison with table 1, the changes in the relative importance of certain causes that result in such age grouping.

There has been a considerable change in the rates and relative positions of the leading causes of death, for the total population, in the United States since 1900, as shown in table 3. Influenza and pneumonia combined heads the list in 1900 and drops to second place in 1937, while considered separately, pneumonia came second in 1900 and fourth in 1937. Tuberculosis, which occupied second place in 1900 (first place with pneumonia and influenza considered separately), had dropped to sixth place in 1937, and cancer moved up from seventh place to third (second with pneumonia and influenza considered separately). In 1937, seventh place has been taken by motor-vehicle accidents, a relatively new cause of death which, although not strictly a public health problem, has overshadowed the common communicable diseases in numerical importance with respect to mortality. The drop in the death rate for typhoid fever from 35.9 in 1900 to 2.1 in

[2] In a personal communication to Dr. H. L. Dunn, Chief Statistician for Vital Statistics, Bureau of the Census.

1937, and in the rate for diarrhea and enteritis from 133.2 to 14.6, is an accurate measure of the achievement in environmental sanitation during that period.

TABLE 2.—*Number and percent of deaths from the principal causes, by narrow age groups, United States, 1937*

Cause of death	School (5-14 years) Number	School (5-14 years) Percent	Cause of death	Adolescent (15-24 years) Number	Adolescent (15-24 years) Percent
All causes	31,778	100.0	All causes	62,099	100.0
Influenza and pneumonia (all forms)	4,202	13.2	Tuberculosis (all forms)	11,070	17.8
Motor-vehicle accidents	2,991	9.4	Motor-vehicle accidents	7,800	12.6
Appendicitis	2,476	7.8	Influenza and pneumonia	6,952	11.2
Diseases of the heart	2,063	6.5	Diseases of the heart	3,725	6.0
Tuberculosis (all forms)	1,653	5.2	Puerperal state	3,608	5.8
Drowning	1,490	4.7	Appendicitis	2,648	4.3
Diseases of the pharynx and tonsils	736	2.3	Homicide	2,214	3.6
Diphtheria	696	2.2	Drowning	1,726	2.8
Nephritis	682	2.1	Suicide	1,634	2.6
	Adult (25-44 years)			Middle age (45-64 years)	
All causes	192,694	100.0	All causes	406,033	100.0
Tuberculosis (all forms)	27,530	14.3	Diseases of the heart	107,740	26.5
Diseases of the heart	23,510	12.2	Cancers and other malignant tumors	60,063	14.8
Influenza and pneumonia (all forms)	22,527	11.7	Influenza and pneumonia (all forms)	35,954	8.9
Cancers and other malignant tumors	14,424	7.5	Cerebral hemorrhage and softening	30,210	7.4
Motor-vehicle accidents	10,877	5.6	Nephritis	29,997	7.4
Nephritis	8,577	4.5	Tuberculosis (all forms)	19,712	4.9
Puerperal state	7,006	3.6	Diabetes mellitus	12,063	3.0
Suicide	6,731	3.5	Motor-vehicle accidents	10,475	2.6
Homicide	5,093	2.6	Suicide	7,932	1.9
	Old age (65 years and over)				
All causes	602,389	100.0			
Diseases of the heart	208,388	34.6			
Cancers and other malignant tumors	68,187	11.3			
Cerebral hemorrhage and softening	63,779	10.6			
Nephritis	61,590	10.2			
Influenza and pneumonia (all forms)	48,738	8.1			
Arteriosclerosis (except coronary arteries)	19,257	3.2			
Falls (accidental)	16,080	2.7			
Diabetes mellitus	15,743	2.6			
Tuberculosis (all forms)	7,376	1.2			

Figure 1 shows graphically the percentage distribution of deaths from tuberculosis, influenza and pneumonia, cancer, diseases of the heart, motor-vehicle accidents, and for all causes by interrupted 5-year age groups. These graphs show clearly that tuberculosis and motor-vehicle accidents are more frequent causes of death in early adult life than at other ages, that "influenza and pneumonia" is relatively

important in infancy and throughout adult life, and that cancer and diseases of the heart are relatively more important in the later years.

Figure 2 shows the trends of the crude death rates (per 100,000 population) for selected causes in the expanding registration area of the United States for 1900 to 1937, and figure 3, with the death rates plotted on semilogarithmic charts, shows the rates of increase or decrease for certain important causes of death.

TABLE 3.—*Changes in the leading causes of death in the United States, 1900–1937. Death rates per 100,000 population in the registration areas of 1900 and 1937*

1900	*Death rate per 100,000 population*
1. Influenza and pneumonia	207.2
2. Tuberculosis (all forms)	201.2
3. Diarrhea and enteritis	133.2
4. Heart disease	111.2
5. Nephritis and Bright's disease	89.0
6. Cerebral hemorrhage (apoplexy)	67.5
7. Cancer	63.0
8. Bronchitis	45.7
9. Diphtheria	43.3
Typhoid fever	35.9
1937	
1. Heart diseases (including diseases of the coronary arteries and angina pectoris)	268.1
2. Influenza and pneumonia	114.5
3. Cancer	112.0
4. Cerebral hemorrhage	86.5
5. Nephritis	79.6
6. Tuberculosis (all forms)	53.6
7. Motor-vehicle accidents	30.7
8. Diabetes	23.7
9. Arteriosclerosis	17.8
Diarrhea and enteritis	14.6
Typhoid fever	2.1

These graphs show that the crude death rates for the major causes differed markedly during the period 1900 to 1937, in both absolute figures (arithmetic change) and in rates of change (semilogarithmic terms). While the death rate from tuberculosis has dropped steadily and almost continuously during the entire period, the rate of decline has been greater since 1918 than during the earlier years. The death rate for influenza and pneumonia has also declined, but the rate of decrease has been slower and less regular than that for tuberculosis. Similarly, the death rate for all causes shows a gradual but irregular decline since 1900. On the other hand, mortality rates for diseases of the heart and cancer have risen steadily during the period, as has the

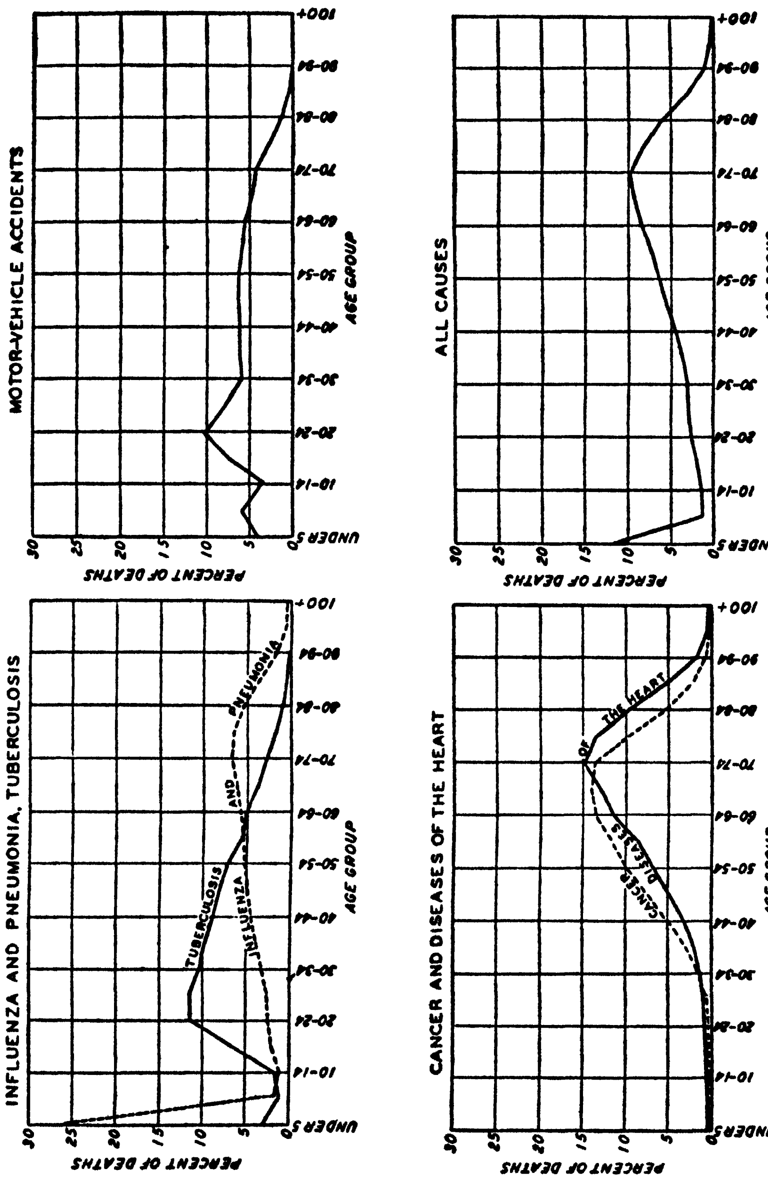

FIGURE 1.—Age distribution of deaths from selected causes, United States, 1933.

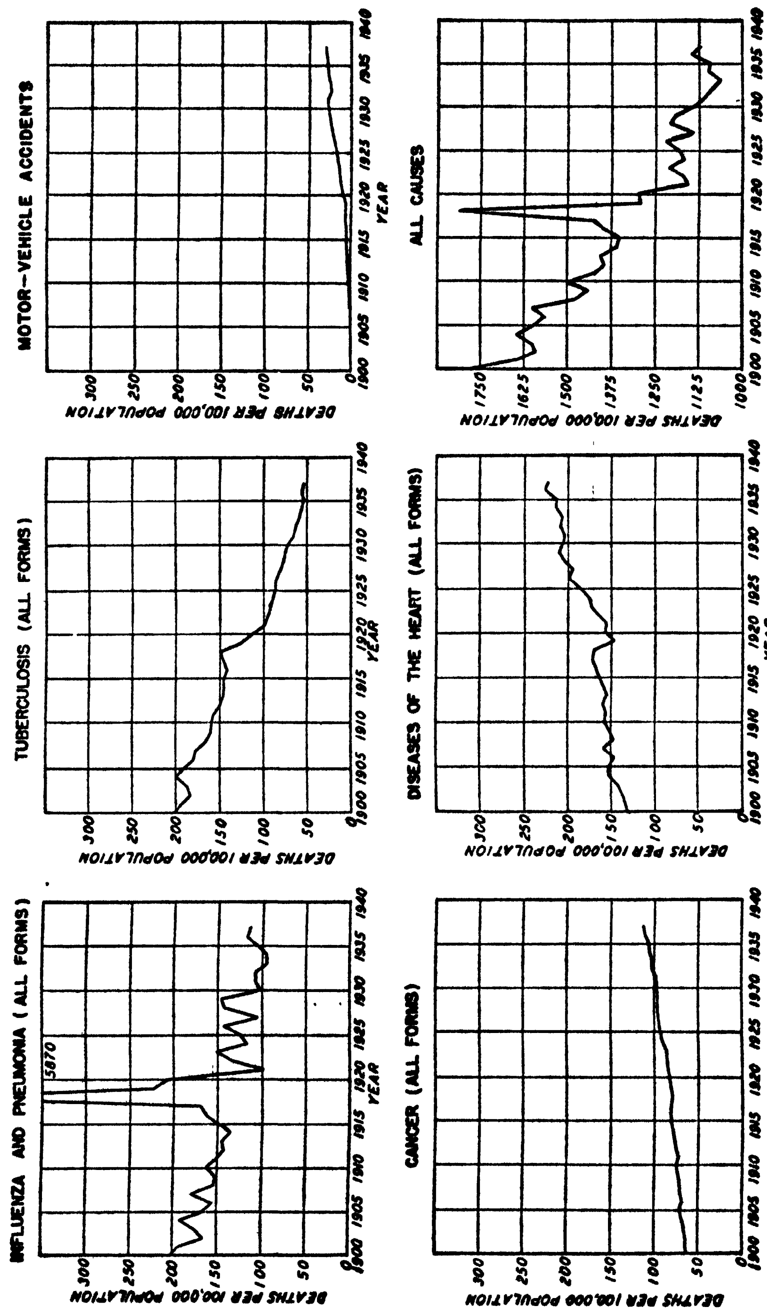

FIGURE 2.—Trends of death rates (per 100,000 population) for selected causes, United States registration area, 1900–1937.

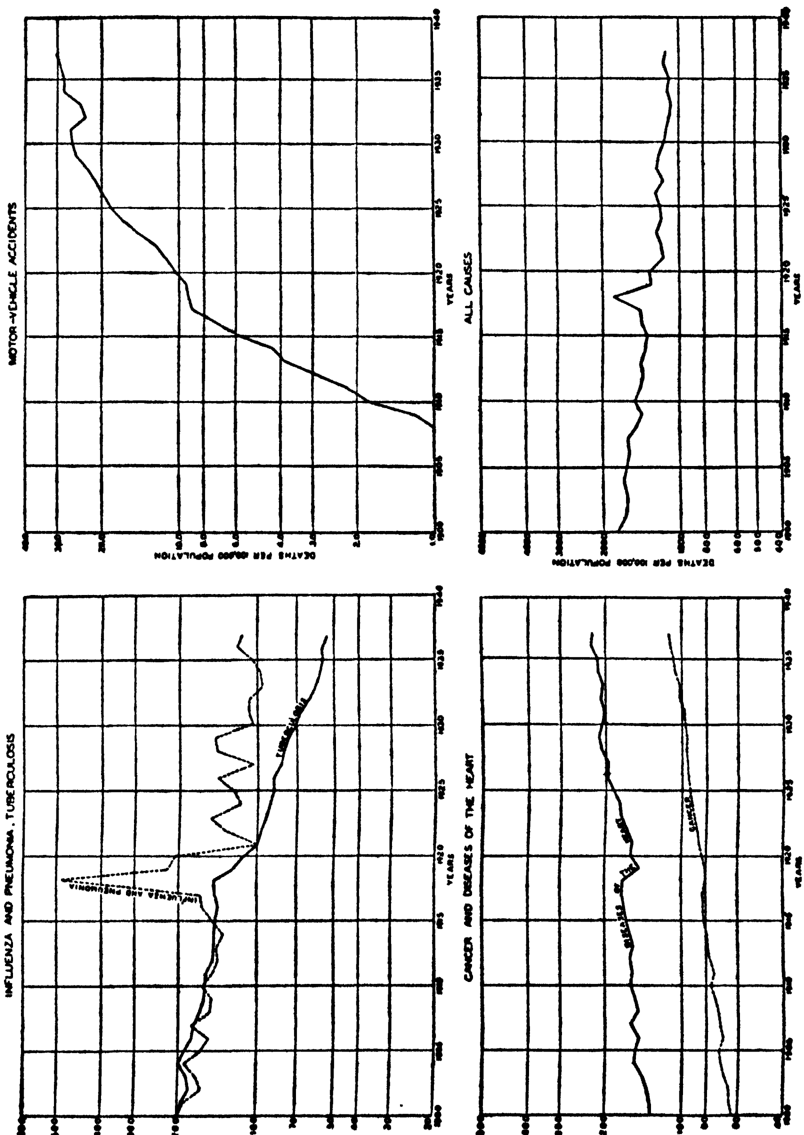

FIGURE 3.—Rate of increase or decrease of death rates for selected causes, United States registration area, 1900–1937.

death rate due to motor-vehicle accidents, although the graph representing the rate of increase in the last-named cause shows a flattening out since 1930.

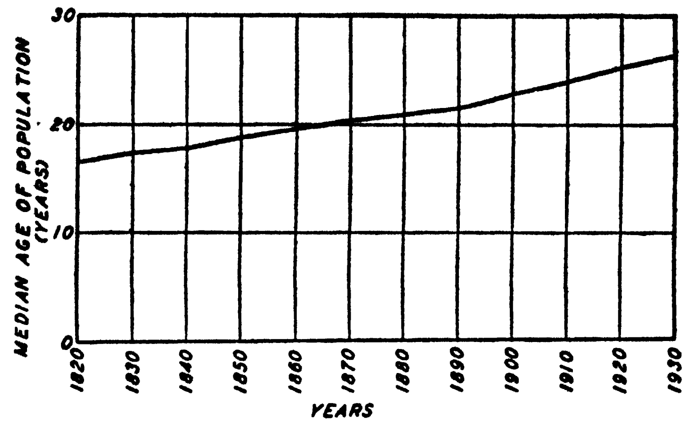

FIGURE 4.—Trend of median age of population, United States, 1820–1930.

As the Bureau of the Census states, "The marked reduction of mortality from the communicable diseases since 1900 has resulted largely from advances in sanitation, immunization, and medical treatment. The saving of life has occurred mainly among infants, children,

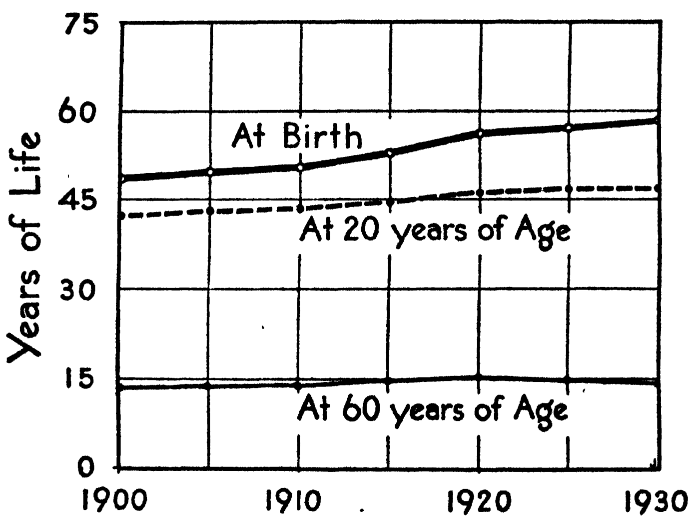

FIGURE 5.—Expectation of life of white males, 1900–1930 (original registration States used for 1900, 1910, and 1930; registration States of 1920 used for 1920).

and young adults. In contrast, the crude death rates for diseases of middle life have increased." This is no doubt due to the ageing of the population, to the larger proportion of persons in the older age groups, and to the fact that prevention and treatment of the degenerative

diseases have not progressed as rapidly as in the case of the communicable diseases. The increasing proportion of older persons is the result of a steadily declining birth rate, a saving of life in the earlier age groups, and the near cessation of immigration of young adults.

Figure 4 shows graphically the rise in the median age of the population from 1820 to 1930 and figure 5 shows the expectation of life of white males at birth, early adulthood, and at 60 years of age during the period 1900–1930. The greatest increase in life expectancy is that at birth, while the expectancy at age 60 remains about the same. The life expectancy for white females, which is higher than that for

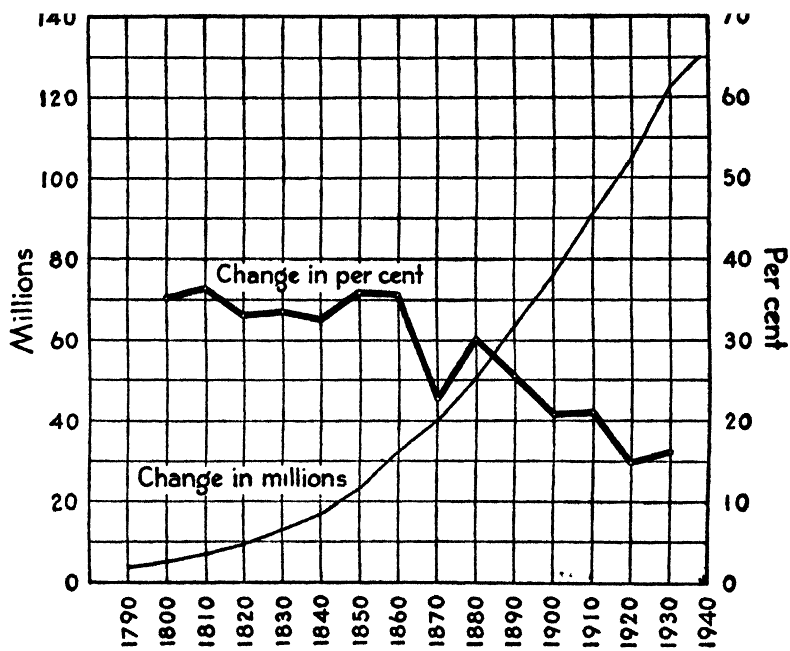

FIGURE 6.—Growth of population of the United States, 1790–1938.

males, follows closely a similar trend; and the expectancy for Negroes, while showing a similar increase, has remained considerably below that of white persons.

It may be expected that the proportion of the population in the older age periods will continue to increase, the present factors remaining constant, until a stabilized population has been reached.[3] The growth of the population will become slower, cease, and finally decline unless the birth rate increases significantly or a large-scale immigration occurs during the next few generations. Figure 6 shows

[3] Karpinos, Bernard D.: A stationary population. Human Biology, 7: 514–537 (December 1935).
Idem: The length of time required for the stabilization of a population. Am. J. Sociol., 41:504–513 (January 1936).
Idem: Stabilized method of forecasting population. Pub. Health Rep., 54:1807–1822 (1939).

the actual growth of the population of the United States from 1790 to 1938. The graph representing this growth, as plotted on an arithmetic chart, shows a continuous and regular increase, but if the data were presented on a semilogarithmic chart, representing the rate of increase, the curve would be almost horizontal up to 1860, when it would drop and start to slope downward, continuing that general trend up to the present time, with slight rises in the census years of 1880, 1910, and 1930. The percentage increase is represented by the heavy line in figure 6, which has been drawn in on the chart issued by the Bureau of the Census.

With the great reduction that has been made in most of the communicable diseases under the impact of public health effort, and with an increasing proportion of older persons in the population, the diseases of these older age groups have become major problems in medical and public health fields. The Public Health Service is turning its attention to their solution and is engaged in research with reference to the etiology and treatment of some of these diseases, especially heart disease and cancer. In addition, however, considerable expansion of diagnostic and hospital facilities may be needed to provide more nearly adequate specific therapy, X-ray, radium, and surgical treatments which are necessary in an effective attack on these diseases.

COURT DECISION ON PUBLIC HEALTH

City authorized to require a license of wholesale soft drink business.—(Illinois Supreme Court; *City of Chicago* v. *Chicago Beverage Co.*, 22 N.E.2d 708; decided June 19, 1939, rehearing denied October 4, 1939.) The Revised Chicago Code provided that no person or corporation should operate a wholesale food establishment without a license and defined "wholesale food establishment" as any building or establishment "used for the preparation, manufacture, canning, bottling, packing, distribution, selling, or offering or keeping for sale at wholesale, any article of food, confection, condiment, or drink used or intended for human consumption or any article which is the ingredient of or is used for or is mixed with or enters into the composition of any such food, confection, condiment or drink." A company engaged in the business of manufacturing, bottling, and selling, at wholesale, carbonated beverages or soft drinks was convicted of violating the said ordinance and on appeal the supreme court said that the question narrowed to whether sections 50 and 53 of article 5 of the cities and villages act conferred power on municipalities to regulate soft drinks. Section 50 gave municipalities power "To regulate the sale of meats, poultry, fish, butter, cheese, lard, vegetables, and all other provisions, and to provide for place and manner of selling the same and to control

the location thereof," while section 53 empowered municipalities "To provide for and regulate the inspection of meats, poultry, fish, butter, cheese, lard, vegetables, cotton, tobacco, flour, meal, and other provisions." The appellate court reviewed some of the prior cases involving the said sections and stated that "It will thus be seen that 'other provisions' and 'all other provisions' have been interpreted as broad and general terms, and to be the equivalent of 'food,' as defined in the pure food act of this State." The State pure food act defined "food" as "all articles used for food, drink, confectionery, or condiment by man or other animals, whether simple, mixed, or compound, and any substance used as a constituent in the manufacture thereof" and the court said that it could not be contended that this definition did not embrace soft drinks or carbonated beverages. The judgment of the lower court was affirmed, the supreme court holding that the above-mentioned sections 50 and 53 authorized the licensing of a wholesale soft drink business.

DEATHS DURING WEEK ENDED OCTOBER 28, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct 28, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,882	7,988
Average for 3 prior years	[1] 8,001	
Total deaths, first 43 weeks of year	354,779	348,687
Deaths under 1 year of age	459	543
Average for 3 prior years	[1] 521	
Deaths under 1 year of age, first 43 weeks of year	21,460	22,652
Data from industrial insurance companies:		
Policies in force	66,574,186	68,282,548
Number of death claims	11,598	12,594
Death claims per 1,000 policies in force, annual rate	9.1	9.6
Death claims per 1,000 policies, first 43 weeks of year, annual rate	10.0	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders ( ) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 4, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934-38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934-38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	2	1	------	------	------	------	42	7	30	30
New Hampshire	0	0	0	0	------	------	------	------	20	2	0	2
Vermont	0	0	0	0	------	------	------	------	416	31	8	8
Massachusetts	4	3	9	7	------	------	------	------	194	165	80	59
Rhode Island	0	0	1	1	------	------	------	------	321	42	0	2
Connecticut	6	2	2	4	12	4	2	2	21	7	37	37
MID. ATL.												
New York	7	18	16	27	[1] 2	[1] 3	[1] 10	[1] 10	65	162	128	128
New Jersey	21	18	11	11	7	6	21	15	7	6	17	23
Pennsylvania	17	33	39	39	------	------	------	------	13	26	40	97
E. NO. CEN.												
Ohio	33	43	57	57	5	7	------	7	26	34	10	79
Indiana	49	33	31	42	10	7	16	28	15	10	4	10
Illinois	20	30	63	54	7	10	12	12	13	20	25	25
Michigan [3]	10	9	26	24	4	4	------	1	75	71	59	36
Wisconsin	2	1	2	3	42	24	10	27	58	33	50	50
W. NO. CEN.												
Minnesota	8	4	4	9	14	7	1	------	54	28	98	16
Iowa	8	4	32	21	------	------	1	1	69	34	19	3
Missouri	17	13	23	39	------	------	19	39	6	5	13	13
North Dakota	7	1	7	2	------	------	------	------	7	1	201	3
South Dakota	0	0	3	3	------	------	2	------	68	9	3	3
Nebraska	23	6	2	7	15	4	1	1	4	1	3	3
Kansas	17	6	8	12	6	2	3	1	106	38	4	4
SO. ATL.												
Delaware	0	0	2	1	------	------	------	------	59	3	3	1
Maryland [3]	49	16	8	10	22	7	4	1	19	6	24	17
Dist. of Col.	16	2	4	9	------	------	1	------	0	0	0	3
Virginia	167	89	101	66	107	57	118	------	7	4	44	38
West Virginia	56	21	27	47	51	19	10	10	11	4	14	14
North Carolina [3]	241	165	142	119	3	2	4	4	161	110	101	39
South Carolina [3]	76	28	32	30	819	300	294	192	3	1	4	4
Georgia [3]	76	46	44	44	58	35	20	------	2	1	4	0
Florida [3]	33	11	20	19	6	2	------	------	42	14	40	1

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 4, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	42	24	40	40	3	2	19	17	2	1	4	29
Tennessee	58	32	32	55	19	11	27	46	11	6	1	3
Alabama [3]	69	39	27	51	123	70	46	46	0	0	9	5
Mississippi [2,3]	35	14	31	21	------	------	------	------	------	------	------	0
W. SO. CEN.												
Arkansas	47	19	37	25	127	51	48	26	5	2	4	2
Louisiana [3]	44	18	11	20	7	3	1	5	5	2	44	3
Oklahoma	44	22	30	16	66	33	76	40	2	1	15	2
Texas [3]	39	47	92	63	181	218	189	138	23	28	12	12
MOUNTAIN												
Montana	0	0	1	1	159	17	9	3	637	68	152	13
Idaho	0	0	0	0	------	------	6	3	51	5	52	2
Wyoming	87	4	0	0	22	1	-	------	895	41	5	2
Colorado	34	7	10	8	63	13	3	------	101	21	5	5
New Mexico	0	0	10	5	12	1	1	1	25	2	14	14
Arizona	49	4	3	2	393	32	57	33	37	3	1	1
Utah [2,4]	20	2	0	0	20	2	2	------	119	12	10	13
PACIFIC												
Washington	15	5	2	2	------	------	------	------	953	309	20	25
Oregon	0	0	2	2	75	15	12	22	119	24	9	9
California [3]	15	18	35	35	22	27	20	21	122	149	324	39
Total	34	857	1,081	1,085	47	996	1,065	846	63	1,549	1,750	1,750
44 weeks	17	18,750	23,568	23,568	169	157,887	53,784	109,521	327	356,340	770,918	680,512

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	1	109	18	6	11
New Hampshire	0	0	0	0	0	0	0	0	20	2	1	6
Vermont	0	0	0	0	0	0	0	0	27	2	3	7
Massachusetts	0	0	0	1	2.4	2	1	2	81	69	78	121
Rhode Island	0	0	0	0	0	0	0	0	31	4	6	12
Connecticut	0	0	2	0	0	0	0	0	89	30	30	31
MID. ATL.												
New York	0.8	2	5	5	9	23	3	6	54	134	178	241
New Jersey	1.2	1	0	1	5	4	0	1	71	60	52	61
Pennsylvania	2	[4] 4	1	3	7	13	6	6	146	288	216	298
E. NO. CEN.												
Ohio	0	0	0	3	8	10	1	2	175	227	256	316
Indiana	3	2	2	1	7	5	0	2	192	129	99	152
Illinois	0	0	1	2	4	6	2	5	132	202	232	325
Michigan [3]	0	0	1	1	15	14	3	4	179	169	295	188
Wisconsin	0	0	0	1	5	3	1	3	220	125	140	163

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 4, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median
W. NO. CEN.												
Minnesota	1.9	1	1	0	29	15	0	1	132	68	72	95
Iowa	4	2	0	0	43	21	0	2	109	54	69	70
Missouri	0	0	2	2	1.3	1	0	2	90	70	117	113
North Dakota	0	0	0	1	0	0	0	1	153	21	17	33
South Dakota	0	0	0	0	8	1	1	1	83	11	18	21
Nebraska	0	0	0	0	15	4	0	0	46	12	21	27
Kansas	2.8	1	0	0	6	2	0	2	179	64	126	99
SO. ATL.												
Delaware	0	0	0	0	20	1	0	0	138	7	6	6
Maryland [2]	0	0	0	1	6	2	0	0	136	44	34	68
Dist. of Col	0	0	0	1	0	0	0	0	81	10	8	10
Virginia	0	0	1	2	1.9	1	0	2	71	38	49	52
West Virginia	2 7	1	0	1	2.7	10	0	0	234	87	74	107
North Carolina [3]	0	0	2	3	0	0	1	1	140	96	88	85
South Carolina [3]	2 7	1	2	0	2.7	1	0	0	68	25	21	11
Georgia [3]	3	2	0	1	1.7	1	1	1	50	30	24	23
Florida [3]	3	1	0	0	0	0	0	0	33	11	16	6
E. SO. CEN.												
Kentucky	3	2	1	1	28	16	1	2	87	50	85	85
Tennessee	0	0	4	2	0	0	0	4	111	63	24	49
Alabama [3]	1.8	1	2	1	0	0	1	1	81	46	24	26
Mississippi [2 3]	2.5	1	0	0	0	0	1	1	23	9	21	19
W. SO. CEN.												
Arkansas	0	0	0	1	5	2	0	1	35	14	32	18
Louisiana [3]	5	2	0	1	0	0	1	1	10	4	21	13
Oklahoma	0	0	1	1	0	0	3	2	46	23	32	22
Texas [3]	1.7	2	1	0	7	8	0	3	23	28	90	66
MOUNTAIN												
Montana	0	0	0	1	0	0	0	0	243	26	31	31
Idaho	0	0	0	0	10	1	0	0	102	10	4	24
Wyoming	0	0	0	0	22	1	0	0	327	15	6	9
Colorado	0	0	1	0	29	6	0	0	149	31	35	35
New Mexico	0	0	0	0	37	3	0	0	99	8	13	17
Arizona	0	0	0	0	0	0	1	1	49	4	11	11
Utah [2 4]	10	1	0	0	50	5	0	1	189	19	13	27
PACIFIC												
Washington	0	0	0	0	3	1	0	1	117	38	25	40
Oregon	10	2	0	0	20	4	0	2	85	17	34	34
California [3]	0	0	2	2	16	20	1	11	121	147	149	149
Total	1.2	29	32	62	8	207	29	150	106	2,659	3,002	3,792
44 weeks	1.5	[5] 1,689	2,531	4,794	6	6,462	1,543	6,759	121	133,725	157,454	187,431

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934–38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov 5, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	1	2	133	22	34
New Hampshire	0	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	1	630	47	50
Massachusetts	0	0	0	0	0	0	4	2	109	93	113
Rhode Island	0	0	0	0	0	0	0	0	69	9	20
Connecticut	0	0	0	0	9	3	2	1	217	73	49

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 4, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934-38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases	1934-38, median	Nov. 4, 1939, rate	Nov. 4, 1939, cases	Nov. 5, 1938, cases
MID. ATL.											
New York	0	0	0	0	6	15	16	13	127	318	471
New Jersey	0	0	0	0	4	3	2	2	115	97	207
Pennsylvania	0	0	0	0	6	12	20	20	168	330	241
E. NO. CEN.											
Ohio	2	2	0	0	11	14	12	18	70	91	131
Indiana	4	3	4	4	6	4	5	5	39	26	13
Illinois	1	2	2	2	9	14	5	22	113	172	486
Michigan [2]	0	0	8	0	21	20	3	5	129	122	192
Wisconsin	0	0	3	6	0	0	0	1	207	118	374
W. NO. CEN.											
Minnesota	6	3	4	4	0	0	3	0	93	48	105
Iowa	16	8	3	7	0	0	7	1	32	16	20
Missouri	0	0	8	6	6	5	4	12	31	24	23
North Dakota	29	4	0	2	0	0	1	1	263	36	7
South Dakota	8	1	2	7	0	0	1	1	38	5	5
Nebraska	4	1	0	4	0	0	0	0	8	2	3
Kansas	3	1	1	1	8	3	2	2	17	6	25
SO. ATL.											
Delaware	0	0	0	0	20	1	1	2	138	7	12
Maryland [2]	0	0	0	0	15	5	12	8	96	31	37
Dist. of Col.	0	0	0	0	8	1	2	0	121	15	10
Virginia	0	0	0	0	4	2	8	9	22	12	31
West Virginia	0	0	0	0	40	15	9	10	59	22	24
North Carolina [3]	0	0	0	0	7	5	7	8	99	68	221
South Carolina [3]	0	0	0	0	55	20	5	5	27	10	47
Georgia [3]	0	0	0	0	18	11	5	9	33	20	3
Florida [3]	0	0	0	0	12	4	0	1	36	12	0
E. SO. CEN.											
Kentucky	0	0	5	0	24	14	12	22	111	64	16
Tennessee	11	6	0	0	18	10	7	11	83	47	22
Alabama [3]	0	0	0	0	9	5	4	7	56	32	5
Mississippi [2, 3]	0	0	0	0	0	0	3	7	------	------	------
W. SO. CEN.											
Arkansas	10	4	2	1	22	9	4	9	15	6	21
Louisiana [3]	0	0	1	0	7	3	9	9	27	11	3
Oklahoma	10	5	3	2	18	9	13	14	0	0	45
Texas [3]	2	2	2	2	12	14	29	34	28	34	34
MOUNTAIN											
Montana	0	0	1	3	9	1	3	3	0	0	26
Idaho	10	1	0	0	20	2	3	2	10	1	1
Wyoming	0	0	0	0	0	0	3	1	0	0	1
Colorado	29	6	2	0	14	3	0	5	39	8	25
New Mexico	0	0	1	0	25	2	12	12	445	36	15
Arizona	0	0	0	0	25	2	5	2	98	8	8
Utah [2, 4]	0	0	0	0	30	3	0	0	576	58	13
PACIFIC											
Washington	0	0	2	6	3	1	7	4	15	5	50
Oregon	5	1	0	0	15	3	3	3	164	33	7
California [3]	4	5	2	0	15	18	15	7	73	89	138
Total	2	55	56	72	10	259	269	327	92	2,284	3,384
44 weeks	8	8,9651	3,192	6,490	10	11,530	12,940	13,609	140	152,382	179,650

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended November 4, 1939; 71 cases as follows: North Carolina, 1; South Carolina, 5; Georgia, 29; Florida, 1; Alabama, 18; Mississippi, 1; Louisiana, 2; Texas, 11; California, 3.
[4] Rocky Mountain spotted fever, week ended November 4, 1939, Utah, 1 case.
[5] There were 3 cases of meningococcus meningitis in Pennsylvania during the week ended Sept. 23, instead of 4 as published in the Public Health Reports of Oct. 6, 1939, p. 1833. Diagnosis was changed in 1 case.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
September 1939										
Alaska	0	20		244	2		0	0	0	1
North Carolina	368	2	60	30	4	7	20	238	1	86
North Dakota	6	33		7	1		3	50	2	7
Rhode Island	1			43	1		1	6	0	1
Utah	0	4		22	0		20	83	0	1
Virginia	197	200	26	34	6	6	12	98	0	81
October 1939										
Connecticut	3	2	1	29	1		5	81	0	11
Delaware	2			1	0		3	25	0	9
Iowa	36	1	13	29	4		60	253	16	12
Missouri	46		14	16	0		3	206	1	45
Wyoming	4	2		216	0		3	17	2	4

September 1939

	Cases
Chickenpox:	
North Carolina	26
North Dakota	24
Rhode Island	11
Utah	47
Virginia	9
Dysentery:	
Rhode Island (bacillary)	21
Virginia (bacillary)	422
Encephalitis, epidemic or lethargic:	
North Dakota	1
Virginia	1
German measles:	
North Carolina	14
North Dakota	2
Rhode Island	2
Utah	7
Impetigo contagiosa:	
Alaska	3
Mumps:	
North Dakota	2
Rhode Island	14
Utah	58
Virginia	40
Rabies in animals:	
Rhode Island	3
Rocky Mountain spotted fever:	
North Carolina	5
Virginia	11
Scabies.	
Alaska	2
Septic sore throat:	
North Carolina	10
Rhode Island	8
Virginia	100
Tetanus:	
Virginia	2
Trachoma:	
Utah	3
Virginia	2

September 1939—Continued

	Cases
Tularaemia:	
Utah	5
Virginia	8
Typhus fever:	
North Carolina	9
Virginia	1
Undulant fever:	
North Carolina	3
Rhode Island	1
Utah	2
Virginia	3
Vincent's infection:	
Alaska	1
North Dakota	8
Whooping cough:	
North Carolina	338
North Dakota	89
Rhode Island	95
Utah	154
Virginia	127

October 1939

	Cases
Chickenpox:	
Connecticut	117
Delaware	6
Iowa	152
Missouri	32
Wyoming	25
Dysentery:	
Connecticut (bacillary)	2
Iowa (bacillary)	2
Missouri	1
Encephalitis, epidemic or lethargic:	
Connecticut	2
Iowa	2
Missouri	4
German measles:	
Connecticut	7

October 1939—Continued

	Cases
Impetigo contagiosa:	
Missouri	5
Mumps:	
Connecticut	88
Iowa	85
Missouri	10
Wyoming	83
Rabies in animals:	
Delaware	3
Iowa	4
Missouri	1
Rocky Mountain spotted fever:	
Wyoming (delayed reports)	5
Septic sore throat:	
Connecticut	6
Iowa	17
Missouri	8
Tetanus:	
Connecticut	1
Missouri	1
Trachoma:	
Missouri	46
Tularaemia:	
Iowa	3
Missouri	3
Wyoming	3
Undulant fever:	
Connecticut	8
Iowa	12
Wyoming	4
Vincent's infection:	
Wyoming	1
Whooping cough:	
Connecticut	214
Delaware	11
Iowa	60
Missouri	64
Wyoming	10

WEEKLY REPORTS FROM CITIES

City reports for week ended October 28, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza: Cases	Influenza: Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Data for 90 cities:											
5-year average	218	93	30	335	471	889	6	338	45	912	-------
Current week	130	85	29	279	341	545	0	314	30	737	-------
Maine: Portland	1	------	0	3	2	0	0	0	0	7	20
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	12
Manchester	0	------	0	0	1	0	0	0	0	0	11
Nashua	0	------	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	0	------	------	0	-----	0	0	-----	0	0	-------
Burlington	0	------	0	0	0	0	0	0	0	2	9
Rutland	0	------	0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	3	------	3	6	15	5	0	5	0	17	185
Fall River	2	------	0	0	3	1	0	1	0	1	35
Springfield	0	------	0	0	1	2	0	0	0	5	20
Worcester	1	------	0	0	9	2	0	0	0	3	39
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	1	15
Providence	1	------	0	18	5	2	0	1	0	23	79
Connecticut:											
Bridgeport	0	1	1	0	0	0	0	2	1	0	30
Hartford	0	------	1	0	0	1	0	1	1	20	37
New Haven	0	------	0	0	1	1	0	0	1	2	53
New York:											
Buffalo	0	------	0	4	4	1	0	4	0	5	119
New York	16	8	3	13	40	49	0	64	5	89	1,385
Rochester	0	------	0	0	0	3	0	0	1	2	59
Syracuse	0	------	0	0	2	2	0	1	0	16	44
New Jersey:											
Camden	0	------	0	0	0	12	0	1	0	0	23
Newark	0	2	0	0	3	3	0	5	0	19	94
Trenton	0	------	0	0	2	3	0	5	1	0	33
Pennsylvania											
Philadelphia	1	4	2	3	13	15	0	20	0	44	479
Pittsburgh	2	6	3	3	9	24	0	5	0	9	154
Reading	4	------	0	0	4	1	0	0	0	6	13
Scranton	1	------	0	0	-------	0	0	-------	0	2	-------
Ohio:											
Cincinnati	4	------	0	2	3	16	0	5	1	9	119
Cleveland	5	10	2	6	4	21	0	14	0	52	187
Columbus	5	2	2	2	6	3	0	4	0	0	95
Toledo	0	------	0	10	2	9	0	2	0	1	53
Indiana:											
Anderson	0	------	0	1	1	0	0	1	0	1	14
Fort Wayne	0	------	0	1	0	5	0	0	0	0	22
Indianapolis	1	------	0	1	5	15	0	6	1	6	95
Muncie	0	------	0	0	5	3	0	0	0	0	12
South Bend	0	------	0	0	1	4	0	1	0	0	13
Terre Haute	2	------	0	0	3	4	0	0	0	0	20
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	11
Chicago	12	5	1	6	24	77	0	32	0	68	649
Elgin	0	------	0	0	0	3	0	0	0	1	8
Moline	0	------	0	0	0	1	0	0	0	0	7
Springfield	1	------	0	2	6	0	0	0	0	0	23
Michigan:											
Detroit	3	2	0	3	8	45	0	13	1	41	228
Flint	0	------	2	0	3	5	0	0	0	4	28
Grand Rapids	0	------	0	0	1	4	0	0	0	3	33
Wisconsin:											
Kenosha	0	------	0	1	0	2	0	1	0	2	10
Madison	0	------	0	1	0	3	0	0	0	4	15
Milwaukee	0	------	0	1	10	22	0	4	0	17	79
Racine	0	------	0	1	0	2	0	1	0	2	11
Superior	0	------	0	3	0	0	0	0	0	0	15
Minnesota:											
Duluth	0	------	0	1	0	3	0	1	0	1	20
Minneapolis	2	------	0	2	2	17	0	0	1	9	103
St. Paul	0	------	0	1	5	9	0	0	0	37	54

City reports for week ended October 28, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	5	0	------	0	0	------
Des Moines	0	------	0	0	0	7	0	0	0	0	39
Sioux City	1	------	------	0	------	8	0	------	0	2	------
Waterloo	3	------	------	0	------	3	0	------	0	0	------
Missouri:											
Kansas City	0	------	0	3	4	7	0	7	1	1	99
St. Joseph	1	------	0	0	6	4	0	0	0	0	28
St. Louis	4	------	0	1	13	12	0	8	1	17	242
North Dakota:											
Fargo	0	------	0	0	2	0	0	0	0	2	7
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	4
South Dakota:											
Aberdeen	0	------	------	0	------	2	0	------	0	0	------
Sioux Falls	0	------	0	0	0	4	0	0	0	0	8
Nebraska:											
Omaha	0	------	0	0	6	3	0	1	0	0	45
Kansas:											
Lawrence	0	------	0	1	0	0	0	0	0	0	3
Topeka	0	------	0	0	1	4	0	0	0	0	12
Wichita	0	------	0	6	0	4	0	1	1	0	29
Delaware:											
Wilmington	0	------	0	1	0	3	0	0	1	4	25
Maryland:											
Baltimore	3	6	0	1	11	7	0	9	2	45	200
Cumberland	0	------	0	0	0	7	0	0	0	0	10
Frederick	0	------	0	1	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	1	------	0	2	10	11	0	10	1	12	157
Virginia:											
Lynchburg	6	------	0	0	0	0	0	0	0	6	9
Norfolk	0	3	0	0	2	3	0	2	0	1	29
Richmond	1	------	1	1	2	3	0	3	0	1	51
Roanoke	2	------	0	0	0	1	0	0	0	0	9
West Virginia:											
Charleston	1	------	0	0	1	1	0	0	0	0	11
Huntington	4	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	1	2	4	0	0	0	6	19
North Carolina:											
Gastonia	1	------	------	0	------	0	0	------	0	0	------
Raleigh	4	------	0	0	1	2	0	0	0	0	21
Wilmington	2	------	0	0	2	2	0	0	0	0	13
Winston-Salem	4	------	0	0	2	4	0	2	0	1	26
South Carolina:											
Charleston	1	14	1	0	2	0	0	1	0	0	24
Florence	3	8	0	0	0	0	0	0	0	1	13
Greenville	0	------	0	0	2	0	0	0	0	0	17
Georgia:											
Atlanta	5	9	2	0	5	3	0	6	1	0	75
Brunswick	0	1	1	0	0	0	0	0	1	0	5
Savannah	0	8	0	0	2	1	0	1	1	0	31
Florida:											
Miami	0	------	0	0	1	0	0	1	1	0	38
Tampa	1	------	0	0	4	1	0	1	0	1	23
Kentucky:											
Ashland	0	------	0	0	0	1	0	0	0	0	4
Covington	0	------	0	0	0	4	0	1	0	5	7
Lexington	0	------	0	0	0	2	0	2	1	0	18
Louisville	1	------	0	0	4	8	0	3	0	20	87
Tennessee:											
Knoxville	0	------	0	0	2	8	0	2	0	0	24
Memphis	0	------	2	0	7	5	0	5	0	11	72
Nashville	4	------	1	0	3	4	0	2	0	3	50
Alabama:											
Birmingham	2	3	0	1	3	4	0	3	1	0	63
Mobile	1	------	1	0	0	4	0	0	0	0	14
Montgomery	2	------	------	0	------	0	0	------	0	4	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	0	0	3	4	0	3	0	0	------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	1	0	0	7
New Orleans	8	------	0	1	8	5	0	15	1	33	159
Shreveport	0	------	0	0	1	0	0	2	0	0	35
Oklahoma:											
Oklahoma City	2	2	0	0	2	0	0	0	0	0	32
Tulsa	0	------	------	0	------	3	0	------	2	6	------

City reports for week ended October 28, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Texas:											
Dallas	7	------	0	1	1	5	0	0	1	8	59
Fort Worth	0	------	0	0	2	2	0	1	0	1	30
Galveston	0	------	0	0	1	0	0	0	0	0	22
Houston	1	------	0	0	6	8	0	5	0	1	90
San Antonio	1	------	0	2	3	0	0	4	0	1	45
Montana:											
Billings	0	------	0	1	0	1	0	0	0	0	12
Great Falls	0	------	0	0	0	8	0	0	0	0	8
Helena	0	------	0	0		0	0	0	0	0	1
Missoula	0	------	0	0	0	0	0	0	0	0	4
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	6
Colorado:											
Colorado Springs	0	------	0	0	0	3	0	0	0	0	6
Denver	8	------	0	2	8	2	0	4	0	9	84
Pueblo	1	------	0	0	1	0	0	0	0	1	15
New Mexico:											
Albuquerque	0	------	0	0	0	1	0	2	0	0	20
Utah:											
Salt Lake City	0	------	0	2	0	3	0	1	0	28	37
Washington:											
Seattle	0	------	0	12	6	0	0	6	1	2	82
Spokane	0	------	0	2	0	10	0	0	0	2	24
Tacoma	0	------	0	142	1	2	0	1	0	0	28
Oregon:											
Portland	0	1	0	1	4	11	0	0	2	1	77
Salem	0	------	------	4	------	0	0	------	0	0	------
California:											
Los Angeles	0	4	0	9	8	24	0	11	1	16	234
Sacramento	0	------	0	1	4	1	0	0	1	0	23
San Francisco	0	------	0	8	5	0	0	5	0	7	165

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	0	3
Fall River	0	0	1
New York:			
Buffalo	0	0	4
New York	2	1	3
Rochester	0	0	2
Syracuse	0	0	1
Pennsylvania:			
Philadelphia	0	0	5
Scranton	0	0	1
Ohio:			
Columbus	0	0	1
Illinois:			
Chicago	0	0	4
Michigan:			
Detroit	0	0	4
Flint	1	0	0
Wisconsin:			
Milwaukee	0	0	1
Minnesota:			
Minneapolis	0	0	7
St. Paul	1	0	1
Iowa:			
Davenport	1	0	0
Des Moines	1	0	3
Missouri:			
St. Louis	0	0	1

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
North Dakota:			
Fargo	0	0	1
South Dakota:			
Aberdeen	0	0	1
Maryland:			
Baltimore	0	0	2
Virginia:			
Norfolk	0	0	1
Kentucky:			
Covington	0	0	1
Tennessee:			
Memphis	0	1	0
Louisiana:			
Lake Charles	1	0	0
New Orleans	1	1	1
Texas:			
Fort Worth	0	0	1
Houston	0	1	1
Colorado:			
Denver	0	0	1
Pueblo	0	0	2
New Mexico:			
Albuquerque	0	0	1
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	1
Sacramento	0	0	3
San Francisco	0	0	6

Encephalitis, epidemic or lethargic.—Cases: Bridgeport, 1; Philadelphia, 2; Wichita, 1.

Pellagra.—Cases: Boston, 1; Charleston, S. C., 3; Florence, 1; Atlanta, 1; Miami, 2; Birmingham, 1; Little Rock, 1; New Orleans, 1; Dallas, 1; Los Angeles, 1.

Typhus fever.—Cases: New York, 1; Wilmington, N. C., 1; Savannah, 1; Tampa, 1; Mobile, 1; Houston, 3.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 21, 1939.—During the week ended October 21, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2				1		3
Chickenpox		17		144	182	34	37	13	63	490
Diphtheria			5	62	4	5	9	2		87
Dysentery				7					5	12
Influenza		62			2	1				65
Lethargic encephalitis				1						1
Measles		2		161	86	11	1		39	300
Mumps				25	35	8	8	1	7	84
Pneumonia	1	5			12				8	26
Poliomyelitis					2	1				3
Scarlet fever		10	1	67	135	19	8	16	21	277
Trachoma						18				18
Tuberculosis	5	9	4	68	48	5				139
Typhoid and paratyphoid fever			1	47	2	1	4	2	1	58
Whooping cough		26		128	71	38	69	27	23	382

PANAMA CANAL ZONE

Notifiable diseases—July–September 1939.—During the months of July, August, and September 1939, certain notifiable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	July		August		September	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	4		7		3	
Diphtheria	9		5		8	
Dysentery (amoebic)	9		8	1	9	2
Dysentery (bacillary)	5	5	1	1	4	
Leprosy	1		1			
Malaria	110	2	96	3	85	3
Measles	1					
Meningococcus meningitis			1	1		
Mumps	2				2	
Paratyphoid fever	1					
Pneumonia		21		24		8
Relapsing fever	1					
Scarlet fever			2			
Tuberculosis		33		27		42
Typhoid fever	4		3	1	2	
Typhus fever					1	

SWEDEN

Notifiable diseases—September 1939.—During the month of September 1939, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	5	Poliomyelitis	124
Diphtheria	20	Scarlet fever	1,934
Dysentery	15	Syphilis	27
Epidemic encephalitis	10	Typhoid fever	12
Gonorrhea	1,261	Undulant fever	10
Paratyphoid fever	106	Weil's disease	4

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of October 27, 1939, pages 1950–1963. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Tientsin.—During the week ended August 5, 1939, 1 case of cholera was reported in Tientsin, China.

Japan—Osaka.—During the week ended October 14, 1939, 1 imported case of cholera was reported in Osaka, Japan.

Plague

Argentina—Salta Province—Colon.—During the period October 16–31, 1939, 1 fatal case of bubonic plague was reported in Colon, Salta Province, Argentina.

Smallpox

Colombia.—During the month of August 1939, smallpox was reported in Argentina, by Departments, as follows: Antioquia, 18 cases, 1 death; Caldas, 52 cases, 1 death; Cundinamarca, 3 cases; Huila, 9 cases; North Santander, 2 cases, 1 death; Santander, 15 cases; Tolima, 13 cases; Valle, 48 cases; Villavicencio, 1 case.

Yellow Fever

Colombia—Antioquia Department.—During the month of August 1939, 1 case of yellow fever with 1 death was reported in Antioquia Department, Colombia.

Ivory Coast—Abengourou.—On October 29, 1939, 1 suspected case of yellow fever was reported in Abengourou, Ivory Coast.

Senegal—Dakar.—On October 30, 1939, 1 suspected case of yellow fever said to have been imported from Tivaouane was reported in Dakar, Senegal.

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Public Health Reports

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Possible Causative Factors of a Stomach Lesion in Mice

The Antibacterial Action of Some Phosphorus Compounds

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

October 8–November 4, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ending November 4, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—The number of cases of poliomyelitis dropped from 1,844 during the 4 weeks ended October 7 to 1,163 for the 4 weeks ended November 4. Each geographic area, except the East South Central, and most of the States in which the disease has been unusually prevalent, shared in the decline; only Iowa (62 cases), Kentucky (59 cases), and West Virginia (15 cases) reported any definite increase in the number of cases over the preceding 4-week period. For the entire reporting area the number of cases was about eight and one-half times that for the corresponding period in 1938, and one and one-third times the 1934–38 average figure (879) for the period.

From a comparison of the recent reports of poliomyelitis with the incidence in previous years, it is evident that the present outbreak has not been confined to any one section of the country but has been widespread, appearing in one or more States in practically every section of the country. Previous epidemics have been confined more or less to certain geographic areas. The minor outbreak of 1936 and 1937 occurred mostly in States in the South Central regions; while in 1934 California and other Western States experienced a more severe outbreak. In 1931, 1933, and 1935 the disease was epidemic in States along the Atlantic Coast and in 1930 the North Central and Western regions were most affected by an outbreak of epidemic-like proportions. There was no epidemic of this disease during 1938

and the number of cases reported for that year was the lowest on record; the years 1929 and 1932 were also nonepidemic years.

Influenza.—An increase in influenza is normally expected at this season of the year. The cases rose from approximately 1,800 during the preceding 4-week period to 3,361 for the 4 weeks ended November 4. The number was only about 85 percent of the figure recorded for the corresponding period in 1938, but it was about 25 percent above the preceding 5-year average incidence for this period. In the South Atlantic region the incidence was about twice the average seasonal incidence and in the West South Central and Mountain regions the numbers of cases were about 50 percent above the 1934–38 median figures; other regions reported a relatively low incidence.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Oct. 8–Nov. 4, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	3,219	4,262	4,262	3,361	3,836	2,659	4,506	5,410	5,410	135	168	243
New England	31	40	48	6	22	13	583	456	440	7	6	10
Middle Atlantic	215	241	262	50	88	80	568	740	1,076	27	30	43
East North Central	410	592	620	188	234	263	418	612	612	25	35	44
West North Central	131	302	349	46	117	164	381	994	694	12	7	16
South Atlantic	1,473	1,576	1,391	1,456	1,729	750	412	580	580	20	36	52
East South Central	439	674	674	241	358	268	53	66	209	20	32	28
West South Central	355	583	509	1,005	830	649	128	232	90	11	13	14
Mountain	95	118	118	272	359	161	516	652	476	3	3	11
Pacific	70	136	152	97	99	163	1,447	1,078	798	10	6	9
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	1,163	136	879	9,382	11,116	12,506	119	225	244	1,096	1,320	1,600
New England	29	6	19	372	456	672	0	0	0	28	24	31
Middle Atlantic	309	27	70	1,545	1,635	1,901	0	0	0	132	220	215
East North Central	215	20	190	2,866	3,915	4,114	24	61	53	186	124	243
West North Central	170	10	51	1,147	1,430	1,430	29	46	91	67	81	117
South Atlantic	69	27	88	1,390	1,216	1,301	1	0	2	212	286	307
East South Central	64	15	46	729	725	725	6	8	8	120	136	202
West South Central	43	8	40	301	540	423	21	23	12	195	272	272
Mountain	125	11	18	377	396	614	19	52	52	70	108	127
Pacific	139	12	95	655	808	849	19	35	58	86	69	69

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—During the 4 weeks ended November 4 the incidence of diphtheria continued at a relatively low level. The number of cases (3,219) was about 75 percent of the number recorded for the

corresponding period in 1938, which figure (4,262) also represents the 1934–38 average incidence for this period. The South Atlantic region reported fewer cases than were recorded for this period in 1938, but the number (1,473) was about 10 percent above the average incidence for recent years; in all other regions the incidence was comparatively low.

Measles.—The number of cases of measles was also relatively low. For the current 4-week period there were 4,506 cases reported, as compared with 5,410 cases in 1938, and 7,216 in 1937. The 1938 figure represented the 1934–38 average incidence for this period. In the Pacific region the number of cases (1,441) was the highest on record for this period in recent years, and in the New England, West South Central and Mountain regions the incidence was slightly above the normal seasonal incidence; other regions reported a relatively low incidence.

Meningococcus meningitis.—During the current 4-week period 135 cases of meningococcus meningitis were reported, approximately 80 percent of the number reported for the corresponding period in 1938, and about 55 percent of the 1934–38 average incidence for this period. The Pacific region reported about the average number of cases for this period, but in all other regions the incidence was below the 1934–38 median level.

Scarlet fever.—For the 4 weeks ended November 4 there were 9,382 cases of scarlet fever reported, as compared with 11,116, 12,506, and 9,939 cases for the corresponding period in 1938, 1937, and 1936, respectively. In the South Atlantic and East South Central regions the incidence closely approximated the 1934–38 average level for this period, but all other regions reported a comparatively low incidence. For the country as a whole the current incidence is the lowest recorded for this period in the 11 years for which these data are available.

Smallpox.—Reports indicate that this disease maintained a relatively low level. For the current period there were 119 cases reported, less than 50 percent of the 1934–38 average incidence for this period. The West South Central region reported a few more cases than might normally be expected, but in other regions the disease either stood at about the normal seasonal level or fell considerably below the average incidence for recent years.

Typhoid fever.—The incidence of typhoid and paratyphoid fever remained at a very satisfactory level. The number of cases (1,096) reported for the 4 weeks ended November 4 was the lowest recorded for this period in the 11 years for which these data are available. The Pacific region alone reported an excess in the number of cases over the average seasonal incidence; California reported 60 cases, as compared with 43, 31, and 34 cases for the corresponding period in 1938, 1937, and 1936, respectively. In the New England region the number of

cases was only slightly below the average seasonal level, but other regions reported very definite decreases from the median figures for the 5 preceding years.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended November 4, based on data received from the Bureau of the Census, was 10.4 per 1,000 inhabitants (annual basis). The average rate for the corresponding period in the 5 preceding years was 10.8.

FACTORS INFLUENCING CARCINOGENESIS WITH METHYLCHOLANTHRENE

II. LACK OF EFFECT OF FOSTER NURSING[1]

By MICHAEL B. SHIMKIN, *Assistant Surgeon*, and HOWARD B. ANDERVONT, *Senior Biologist, United States Public Health Service*

Studies of the extrachromosomal influences in the genesis of breast tumors in mice (*1*) culminated in the interesting observation that if the offspring of mice susceptible to spontaneous mammary carcinoma are removed from their mothers before suckling has taken place and are foster nursed by mice of a strain that has a low susceptibility to breast tumors, the incidence of breast cancer in such offspring is radically reduced (*2*). Thus, if strain A mice (high breast tumor line) are suckled by strain C57 black (low breast tumor line), the foster-nursed A strain females develop very few spontaneous mammary tumors; the finding has been confirmed in this laboratory, using the C_3H strain as the high tumor line (*3*).

Apparently there is a factor in the milk of the high breast tumor lines of mice that must be introduced into the offspring before breast cancer can develop in the animal. This factor has not been incriminated in the genesis of other types of tumors. Bittner (*4*) has reported that foster nursing has no influence upon the incidence of spontaneous primary lung tumors in strain A mice. Moreover, it has been shown that the incidence or the susceptibility to the induction of one type of tumor in an animal is not correlated to the incidence or the susceptibility to induction of some other type of neoplasia in the same animal. There is no correlation, for example, between the susceptibilities of eight strains of mice to spontaneous breast tumors, induced pulmonary tumors, and transplantable tumors (*5*).

It was not expected, therefore, that the "milk factor" apparently necessary for the occurrence of spontaneous breast cancer in mice

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

would influence the production of neoplasms with carcinogenic hydrocarbons. It was felt that the possibility was sufficiently interesting, however, to perform the following experiment.

EXPERIMENTAL

Brother-sister mating of mice of strains C_3H, C, C57 black, I, and Y was started in November 1938. Gestation occurred between 3 and 5 weeks later. Within 17 hours or less after birth, half of each C_3H litter was transferred to a mother of strains C, C57 black, I, or Y, and at the same time half of the litter of strains C, C57 black, I, or Y was given to a C_3H female.

Thus, C_3H litter mates were obtained in which half were nursed by their own mothers and half were foster nursed by mothers of one of the four other strains; of the litters of C, C57 black, I, or Y strains, half were nursed by their own mothers and half by C_3H females.

The sexes and the strains were separated at weaning and the females reserved for other investigations. The males were marked individually and were injected subcutaneously in the right axilla with methylcholanthrene, in January 1939, when they were about 1 month old. For mice of strains C_3H, C, C57 black, and I, the dose of the hydrocarbon employed was 0.5 mg. and for strain Y mice, 1.0 mg. The methylcholanthrene was a synthethic compound with a melting point of 178.6°–179.6° C. (corr.), and the solvent was 0.25 cc. of lard, filtered at 37°–39° C.

The mice were examined weekly. As soon as an indubitable tumor was palpable, and as soon as it was ascertained that the mass was growing progressively, the mice were killed and necropsied.

The results are presented in table 1. It is apparent that foster nursing exerted no influence upon the latent period or upon the incidence of tumors produced with methylcholanthrene in the doses used. When the data were resolved according to litter mates, as shown in table 2, the same findings were reiterated. Strain I mice, 8 nursed by their own mothers and 5 foster nursed by C_3H females, received 0.5 mg. of methylcholanthrene; by 26 weeks only 2 animals had developed a tumor, and the strain has not been included in the results.

DISCUSSION

The experiment demonstrates that the foster nursing of male mice of strains highly susceptible to the induction of neoplasia with methylcholanthrene by mice of lower susceptibility to this agent, or the foster nursing of male mice of strains resistant to the action of methylcholanthrene by mice of susceptible strains, does not alter the susceptibility of the animals to the subcutaneous introduction of the hydrocarbon.

TABLE 1.—*Lack of influence of foster nursing upon carcinogenesis with methylcholanthrene*

Time, in weeks				7	8	9	10	11	12	13	14	15	16	17	18	19	20+		
Mice	Foster nursed	Methylcholanthrene, mg. subcutaneous	Number of mice injected	Number of tumors														Number of tumors	Average time in weeks
C_3H ♂		0.5	21	--	1	2	10	2	2	--	2	--	--	--	--	1	----	20	11.1
Do	x C57	0.5	5	--	1	1	--	1	--	1	--	1	--	--	--	--	----	5	11.2
Do	x Y	0.5	14	1	2	5	2	2	--	--	--	--	1	--	1	--	----	14	10.3
Do	x C	0.5	4	1	--	1	--	--	--	--	1	--	--	--	1	--	----	4	12.0
Do	x I	0.5	13	1	1	2	3	2	--	1	1	--	1	--	--	--	----	12	10.6
C ♂		0.5	6	1	1	2	--	1	2	--	--	--	--	--	--	--	----	6	11.3
Do	x C_3H	0.5	10	--	--	2	1	4	--	--	2	--	--	--	--	--	----	9	11.1
C57 black ♂		0.5	10	--	--	1	--	3	1	1	1	1	1	--	1	--	----	10	13.0
Do	x C_3H	0.5	15	--	--	2	--	3	4	1	2	1	--	1	--	--	----	14	12.3
Y ♂		1.0	11	--	--	1	--	--	--	--	--	2	2	--	--	1	----	7	15.3
Do	x C_3H	1.0	11	--	--	--	2	1	--	2	--	2	--	1	1	--	----	10	14.6

TABLE 2.—*Carcinogenesis with methylcholanthrene in normal and foster nursed litter mates of four strains of mice*

Time, in weeks			7	8	9	10	11	12	13	14	15	16	17	18	19	20
Strain	Methylcholanthrene, mg.	Number in litter	Tumors													
C_3H ♂	0.5	2					Y		O							
Do	0.5	4			O	O		O		C						
Do	0.5	4				OOI						I				
Do	0.5	6				OOO	I	O	I							
Do	0.5	4	I	I	I	O										
Do	0.5	2			O							Y				
Do	0.5	3				OY	O									
Do	0.5	4			YY	OO										
Do	0.5	5		O			B		B	O	B					
C ♂	0.5	3	O			X		O								
Do	0.5	4			OX		X	O								
C57 ♂	0.5	5					O		X	X	X	O				
Do	0.5	5			X		OX	O		O						
Do	0.5	4			X		O			O		X				
Do	0.5	2					X	O								
Y ♂	1.0	5				O					X	O	X		O	
Do	1.0	3			O						XO					
Do	1.0	4				X			X		O			X		

Key.—O = nursed by own mother.
X = foster nursed by C_3H.
C = foster nursed by C.
B = foster nursed by C57 black.
I = foster nursed by I.
Y = foster nursed by Y.

Table 2 indicates that the spread of the latent period of carcinogenesis in litter mates of inbred mice is no less than the spread of the latent period in unselected members of the same strain.

An incidental observation in this study is the relative susceptibility to methylcholanthrene of the four strains of mice employed. A report of investigations on the relative susceptibility of eight strains of mice

to carcinogenic hydrocarbons, made in this laboratory, was published in 1938 (*5*); the data which are pertinent to the present discussion are recapitulated and are compared in table 3 with the present findings.

It is to be noted that the relative susceptibility of the four strains agrees in the two experiments, i. e., C_3H is the most susceptible, the C and the C57 black strains are next in order, and the Y strain is most resistant to the action of methylcholanthrene. The mean latent periods, however, are significantly shorter in the present study, despite the use of smaller doses of the hydrocarbon.

TABLE 3.—*Comparison of latent periods of carcinogenesis in present study and those found in a previous study at this laboratory* (*5*)

Time, in weeks				8	10	12	14	16	18	20	22	24	32-36	Number of tumors	Average time in weeks	Source
Strain	Sex	Methylcholanthrene, mg.	Number of mice	Number of tumors												
C_3H	♂	0.5	57	8	26	9	6	3	8	1	----	----	-----	55	10.8	Present study.[1]
Do	do	.8	19	12	7	--	--	--	--	--	----	----	-----	19	8.3	Shimkin (*6*).
Do	do	2.0	24	19	5	--	--	--	--	--	----	----	-----	24	8.2	Andervont (*5*).
C	do	.5	16	1	5	5	1	--	--	--	----	----	-----	15	11.2	Present study.[1]
Do	do	.8	21	--	--	7	--	3	--	5	----	3	1	19	16.7	Andervont (*5*).
C57 black	do	.5	25	--	3	11	5	3	2	--	----	----	-----	24	12.6	Present study.[1]
Do	do	.8	12	--	--	2	4	2	--	1	----	----	2	11	17.2	Andervont (*5*).
Y	do	1.0	22	--	3	1	2	6	2	2	----	1	-----	17	14.9	Present study.[1]
Do	♂ and ♀	2.0	28	--	--	2	5	4	2	2	2	2	-----	19	17.1	Andervont (*5*).

[1] Data from table 1.

Analysis of the factors that may have been responsible for this discrepancy reveals that all the mice were males, were raised in this laboratory, and were kept under similar environmental conditions. The animals were examined by different investigators (H. B. A. and M. B. S.), but the technique of examination and the criteria for recording the results were identical.

The mice previously used were 2 to 3 months of age, whereas the mice in this report were injected when about 1 month old. It has been found (*6*) that tumors evoked with methylcholanthrene arise earlier in younger mice than in older mice of the same strain, but the slight age difference probably is not sufficient to explain disparities of as much as 5 weeks.

The same sample of synthetic methylcholanthrene,[2] with the same melting point, was used in both experiments. It is possible that carcinogenesis was slower with the larger dose of the hydrocarbon because of the greater degree of necrosis of the tissues at the injection site. The evidence available at present, however, indicates that, within the dose range employed (0.5 to 1.0 mg.), tumors should have appeared earlier with the larger amount. No external ulceration occurred in any of the animals. Beck (*7*) has reported that acute

[2] Prepared by Dr. E. B. Hershberg.

and subacute inflammation at the site of introduction of 3:4-benzpyrene does not influence carcinogenesis.

The solvent used in both instances was lard, obtained from the same commercial source but at different dates. The lard was filtered at 37°–39° C., and the filterable portion sterilized by heating at 100° C. It was heated again to dissolve the methylcholanthrene and stored in the icebox at 4° C.; the temperature was raised to about 40° C. before the solution was injected into the animals. A more concentrated solution was used previously (0.8 mg. in 0.2 cc. as compared with 0.5 mg. in 0.25 cc.); the influence of the lower concentration and of the slightly greater amount of lard employed in the present investigation is not evident at this time.

It has been determined that crystalline 1:2:5:6-dibenzanthracene produces tumors more slowly than the hydrocarbon in solution (*8*); neither solution of methylcholanthrene was supersaturated, so that crystallization of the compound in the tissues may be precluded as a modifying factor.

It has been brought out that lard is a complex, variable mixture which may undergo changes on storage or on being heated (*9*). It is possible that the discrepancy between the two series may be attributed to the variability of the solvent. Investigations being conducted at present in this laboratory indicate that the latent periods and incidence of tumors after injection with methylcholanthrene vary widely when different samples of lard are used as solvents, whereas with certain pure glycerides (especially tricaprylin) as solvents for the hydrocarbon the results are much more consistent (*10*).

The spread of the latent period in litter mates, and the number of mice used in each series, however, make it apparent that the variability of the experimental animal itself, as well as the possible extraneous factors mentioned above, must be considered as the explanation for the difference in these and in similar investigations.

A review of the factors that may be responsible for discrepancies in apparently similar experiments indicates the fallacy of comparing too exactly data of this nature from different laboratories, especially where the quality of the hydrocarbon and the solvent are unknown, where the experimental animals are kept under different conditions and are used at different ages, and where the criteria for recording the results vary with the investigators.

CONCLUSION

Foster nursing of male mice of a strain (C_3H) highly susceptible to the induction of subcutaneous sarcoma with 0.5 mg. methylcholanthrene in lard by mice of lower susceptibility to the agent (I and Y strains), or the foster nursing of male mice of strains more resistant

to the action of methylcholanthrene in 1.0-mg. doses (Y strain) by mice of a highly susceptible strain (C_3H), does not alter the susceptibilities of the animals to formation of tumors with the hydrocarbon.

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STUDIES ON SOME POSSIBLE CAUSATIVE FACTORS OF THE SPONTANEOUS ADENOMATOUS LESION OF THE STOMACH IN MICE OF STRAIN I[1]

By H. B. Andervont, *Senior Biologist, United States Public Health Service*

Previous communications (*1, 2, 5*) have described the occurrence, pathology, development, and genetic basis of the adenomatous stomach lesion in strain I mice. The lesion arises spontaneously and is characterized by an overgrowth of the epithelium in the glandular portion of the stomach. It is not considered malignant because of its symmetric development, the absence of metastases, and because susceptibility to its development is inherited in a recessive manner. The lesion is not due to a communicable disease for it does not occur in mice of other strains when raised in close contact with strain I mice, and it is not associated with the presence of any gross parasite, for histologic studies of all stages in its development do not reveal the consistent presence of any such organism. The present paper

[1] From the Office of Cancer Investigations, U. S. Public Health Service, Gibbs Memorial Laboratory, Harvard University, Cambridge, Mass.

reports experiments made to determine whether the gastric hyperplasia might be caused by an infectious agent or be due to vitamin A deficiency.

STUDIES OF THE INFECTIVITY OF THE LESION

The possible infectivity of the process was investigated by feeding tissues of the lesion to mice. This was accomplished by sacrificing strain I mice which had pronounced lesions, removing the entire stomach, and feeding it to the experimental mice. If the animals were deprived of food for 24 hours before the feeding, they devoured the stomachs immediately.

Two experiments were performed. In the first, 6 strain C mice were fed stomachs from 2 strain I animals. Six months later the mice were sacrificed and all had normal stomachs, indicating that if the lesion is the result of an infection the etiological agent is specific for mice of strain I. In the second experiment 8 litters of strain I mice were removed from their mothers at the conclusion of the nursing period and divided into two equal groups. One group was fed stomachs from 4 strain I mice and the other group, which served as controls, was given only a diet of dog chow. If the lesion is caused by an infectious agent which localizes in the gastric mucosa, the animals fed the stomachs might be expected to develop gastric hyperplasia earlier and to a greater extent than their litter mate controls. Entire litters were sacrificed and necropsied from 3 to 4 months after the time of feeding and in every instance there was no apparent difference in the appearance of the stomachs of the control and experimental animals.

Although it might seem unjustifiable to state with certainty that the lesion is not an infectious disease, the results of the feeding experiments strongly suggest that an infectious agent is not involved.

VITAMIN STUDIES

Since the pathologic changes of vitamin A deficiency appear in epithelial structures, it was decided to study the influence of vitamin A upon the occurrence of the lesion. These investigations were made possible through the kindness of Prof. Percy R. Howe and Dr. Mark Elliott of the Forsyth Dental Infirmary, who supplied the diets and gave much valuable advice.

In one experiment an effort was made to produce regression of the lesion by feeding mice a diet rich in vitamin A. Twenty-two strain I female mice were used, all of which were 9 months old. The selection of mice of this age assured the use of animals with definite lesions, for it has been shown (*5*) that the lesion is well developed in all 8-month-old strain I animals. The mice consisted of 7 litters and were divided into two groups with representatives from each litter

in the groups. The experimental group was given the following diet:

	Percent
Casein	18
Butter fat	10
Yeast	8
Mendel's inorganic salt mixture	4
Harris purified vitamin A free starch	60

The control group was given Purina dog chow, which is the standard mouse diet used in this laboratory.

The animals remained on the diets for 3 months and during that time 8 mice (5 experimental and 3 control) died; at the termination of the experiment all the remaining mice were sacrificed. The stomach of each animal dying or killed was preserved by tying off the esophagus and pylorus, injecting fixative into the lumen, and placing the entire organ in fixative. After hardening for 24 hours, the stomach was cut longitudinally through the orifices; one half was kept for macroscopic observations and the other half prepared for histologic studies.

Macroscopic and microscopic examinations revealed that every mouse had a definite stomach lesion with no obvious difference between those of the experimental and control groups. It is concluded that the ingestion of a vitamin A rich diet for 3 months had no influence upon pronounced stomach lesions in strain I mice.

In another investigation young strain I mice were fed diets rich or deficient in vitamin A. If the genetic constitution of strain I mice is such that the mice require more vitamin A than is present in the diet of dog chow, or if they are unable to utilize the vitamin to the same extent as other inbred mice, the development of the gastric lesion should be inhibited in those fed the vitamin A rich diet and should be accelerated in those fed the diet deficient in vitamin A.

Forty strain I mice, consisting of 27 females and 13 males ranging in age from 4 to 7 weeks, were employed. The animals were from 8 litters and were divided into three groups, two receiving the experimental diets and one the control diet of dog chow. There were representatives of seven litters in each group, while one litter of 2 mice was divided between the deficient and control diets. Care was taken to use animals of the same sex as controls for those fed the experimental diets, for it has been shown (*2*) that the lesion appears earlier and is, as a rule, more pronounced in male mice.

Eight 10-week-old females of strain C_3H and 6 of strain M "leaden" were included in the study. These animals, representing 3 strain C_3H litters and 1 strain M litter, were divided so that some were given the vitamin A deficient diet and others the control diet. None was fed the vitamin A rich diet.

The designation of the groups of mice and the diets each received is presented below.

Group A.—These mice were given the vitamin A rich diet, the formula being the same as that used in the previous investigation.

Group B.—These mice were fed the vitamin A deficient diet, which was made up as follows:

	Percent
Lard	15
Casein	18
Yeast	4
Mendel's inorganic salt mixture	4
Harris purified vitamin A free starch	59

All the mice of this group were kept in cages with wire mesh bottoms so that fecal matter dropped through the floor.

Group C.—These mice were fed dog chow and were controls for groups A and B.

An unlimited supply of drinking water was available at all times. Data regarding the mice used in this investigation are given in table 1.

TABLE 1.—*Vitamin A feeding experiment. Summary of mice used*

Strain	Sex	Group A Number of mice fed diet rich in vitamin A	Group B Number of mice fed diet deficient in vitamin A	Group C Number of mice fed diet of dog chow
I	F	7	9	11
I	M	3	4	6
C_3H	F		5	3
M	F		3	3
Total		10	21	23

The experiment began on April 2, 1938, and the mice of group A were fed the vitamin A rich diet exclusively until the conclusion of the experiment. The animals of group B were in ill health 36 days after the beginning of the experiment and, since it was desirable to keep the mice alive for at least 100 days, they were fed the deficient diet plus 1 percent of butterfat. This food was administered for only 30 days, following which the mice were again given the deficient diet exclusively.

Surviving mice of strain I were sacrificed on September 22, 1938. Up to that time the experimental mice of group A had received the vitamin A rich diet for 173 days, while those of group B had been fed the vitamin A deficient diet for 143 days and the diet containing 1 percent butterfat for 30 days. Mice of strains C_3H and M were maintained on the diets until October 5, 1938; thus, these C_3H and M animals of group B received the deficient diet for 156 days and the deficient diet plus 1 percent butterfat for 30 days.

A group B strain I female was the first animal coming to autopsy. It was sacrificed because of illness 126 days after the beginning of the experiment and had a slight hyperplasia of the glandular mucosa of

the stomach and, in addition, a thickened forestomach with 6 definite papillomas on the lining. Between that time and the conclusion of the experiment, 9 other strain I mice, consisting of 3 males of group A and 2 females and 4 males of group B, became ill and were sacrificed. All these mice were included in the results of the investigation. None of the strain C_3H or strain M mice died during the course of the experiment.

The I mice of group B, mentioned in the preceding paragraph, were sacrificed when they were obviously about to die. Their eyes were closed and encrusted and their coats roughened. They assumed a humped posture and staggered weakly when trying to move about. It cannot be stated with certainty that these symptoms were due to a deficiency of vitamin A because most of the strain I mice of group B lived through the experiment without such pronounced signs of ill health. However, at the conclusion of the experiment the strain I mice of group B were in worse condition than the C_3H or M mice of the same group. This may have been due to the fact that the C_3H and M animals were from 3 to 6 weeks older than the I mice when the experiment began, or else the strain I mice were more responsive to a deficiency of vitamin A. All mice of groups A and C were in good health at the end of the investigation.

The weight of each mouse was recorded at the beginning of the experiment, at five regular intervals during its progress, and at its termination. Table 2 summarizes the average weights of the mice according to strain, sex, and group and includes all animals dying or killed during the experiment.

It is seen in table 2 that the young of all 3 strains developed normally on the vitamin A rich or dog chow diets. It was surprising that mice fed the vitamin A deficient diet also showed a slight average gain in weight.

TABLE 2.—*Vitamin A feeding experiment. Average weights of mice according to strain, sex, and group*

Strain	Sex	Group [1]	Number of mice	Average weight at beginning of experiment (gm.)	Average weight when sacrificed (gm.)
I	F	A	7	16.5	27.0
I	F	B	9	17.7	19.7
I	F	C	11	17.3	30.2
I	M	A	3	15.8	27.6
I	M	B	4	17.6	18.2
I	M	C	6	17.9	30.4
C_3H	F	B	5	20.7	24.3
C_3H	F	C	8	20.8	33.0
M	F	B	8	20.6	24.5
M	F	C	8	19.0	26.6

[1] Group A fed vitamin A rich diet; group B fed vitamin A deficient diet; Group C fed dog chow.

As in the preceding experiment, the stomach of every mouse was filled with fixative and, after hardening, was cut longitudinally through

the orifices. The organ was examined macroscopically for the degree of development of the spontaneous lesion and other gross changes. One-half of each stomach was prepared for histologic studies. The results of the macroscopic and microscopic examinations are summarized in table 3.

TABLE 3.—*Vitamin A feeding experiment. Summary of results*

Strain	Sex	Group[1]	Number of mice used	Spontaneous lesion in mucosa			Forestomach	
				Slight hyperplasia	Moderate hyperplasia	Pronounced hyperplasia	Hyperkeratosis	Papilloma formation
I	F	A	7	3	3	1	1	0
I	F	B	9	7	2	0	9	5
I	F	C	11	1	4	6	2	0
I	M	A	3	1	2	0	0	0
I	M	B	4	3	1	0	3	1
I	M	C	6	0	1	5	1	0
C_3H	F	B	5				4	0
C_3H	F	C	3				0	0
M	F	B	3				3	0
M	F	C	3				0	0

[1] Group A fed vitamin A rich diet; group B fed vitamin A deficient diet; group C fed dog chow.

So far as the adenomatous lesion is concerned, the results presented in table 3 show that a deficiency of vitamin A is not the chief factor in its occurrence, for it was, on the average, less pronounced in strain I mice fed the deficient diet than in those kept on the vitamin A rich or dog chow diets. Furthermore, strain C_3H and strain M mice of group B showed no change in the glandular portion of their stomachs.

The most striking feature noted in the mucosa of stomachs from strain I animals was that the mice which were fed dog chow developed considerably more hyperplasia than those maintained on the experimental diets. Of 23 mice given diets rich or deficient in vitamin A only 1 developed a pronounced gastric lesion, while of 17 mice given dog chow 11 had extensive lesions. The macroscopic observations in this respect were confirmed by microscopic studies. In addition, histologic investigations also revealed an abundance of dilated acini in group C mice of strain I, but only a few in mice of groups A and B. Indeed, the presence of numerous enlarged acini identified the I mice maintained on the dog chow (figs. 1 and 2). These acini have been mentioned in an earlier pathologic description of advanced stomach lesions (*5*).

The variation in the extent of spontaneous stomach lesions in strain I mice fed different diets raises the question of whether the physical state of the food was a contributory factor to this result. The experimental diets were obtained as dry powders, were made into a paste by the addition of distilled water, and formed into small cakes which were dried at 37° C. The cakes were rather soft and crumbly because of the high fat content. The dog chow was obtained

FIGURE 1.—Section through the glandular portion of the stomach from a strain I female mouse, aged 8.5 months, which received a vitamin A rich diet exclusively for 173 days. The spontaneous lesion is not pronounced. The section is near the junction of the two portions of the stomach and some of the squamous lining of the forestomach can be seen (× 70).

FIGURE 2.—Section through the glandular portion of the stomach from a strain I female mouse, aged 8.5 months, which received a diet of dog chow exclusively. The spontaneous lesion is pronounced. Compare with the less advanced lesion shown in figure 1 which occurred in a litter mate. Note the presence of enlarged acini (× 70).

FIGURE 3.—Section through the forestomach from a strain I female mouse, aged 8.5 months, which was fed a vitamin A deficient diet exclusively for 143 days. Note the hypertrophy and hyperkeratosis of the squamous lining (× 70).

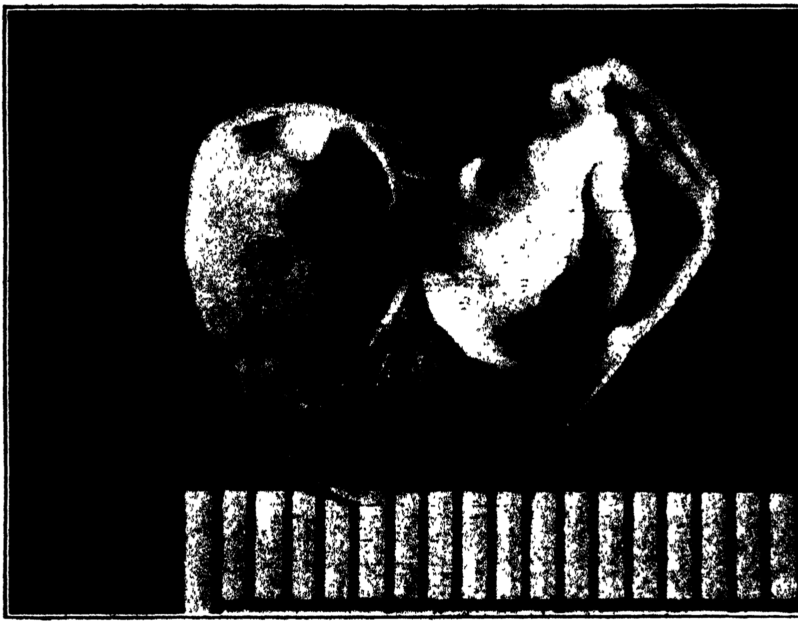

FIGURE 4.—The stomach from a strain I female mouse, aged 7 months, fed a vitamin A deficient diet exclusively for 138 days. A part of the forestomach is thickened and contains a papilloma, while the mucosa is normal in appearance (X 4).

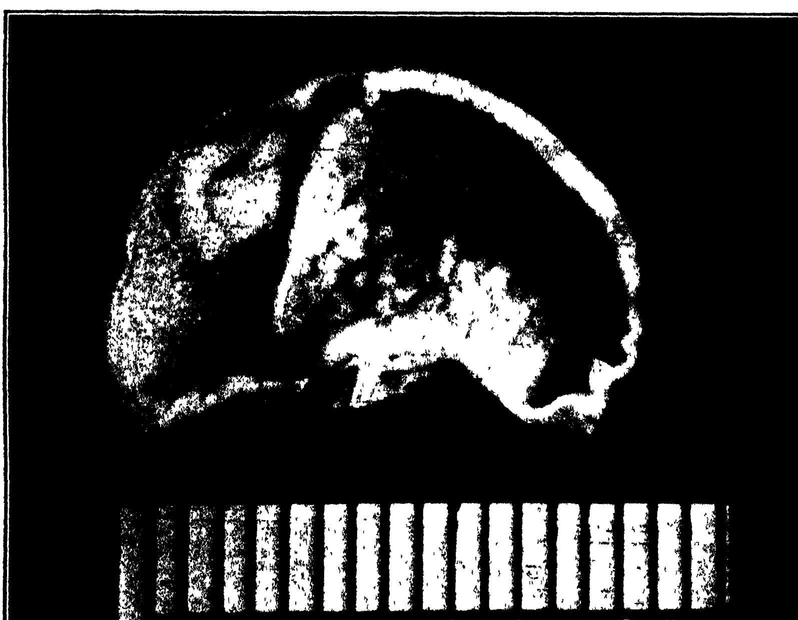

FIGURE 5.—The stomach from a strain I female mouse, aged 8.5 months, receiving a vitamin A deficient diet exclusively for 143 days. Note the thickened wall and roughened-lining of the forestomach which also contains a craterlike wart. The glandular portion of the stomach contains a moderate spontaneous lesion. A hair ball was found in this stomach (X 4).

FIGURE 6.—Section through a papilloma in the forestomach of a strain I female mouse, aged 8.5 months, given a vitamin A deficient diet exclusively for 143 days. Note the marked hyperplasia of the squamous lining (× 70).

FIGURE 7.—Another section through the papilloma shown in figure 6. Note the hyperplasia of epithelial cells and hyperkeratinization (× 70).

as hard cakes and fed to the mice as such. According to the formula of the manufacturer they contained 7 percent fiber, while the experimental diets contained no roughage. This difference in the diets suggests that strain I mice given food containing a large amount of roughage may develop more extensive lesions than those fed a bland diet. This possibility is receiving attention.

While noting the degree of spontaneous hyperplasia in the glandular portion of the stomachs, it was found that in many mice the lining of the forestomach was definitely thickened and rough (fig. 5). As shown in table 3, this change occurred in 1 of 10 mice of group A, in 19 of 21 mice of group B, and in 3 of 23 mice of group C. Histologic studies of the thickened forestomachs revealed a pronounced hypertrophy and hyperkeratosis of the lining squamous epithelium (fig. 3). In addition to the generalized thickening, the forestomachs in 6 of 13 strain I mice of group B also contained papillomas or warty excrescences (figs. 4 and 5). Microscopically the papillomas consisted of a pronounced hyperplasia and keratinization of epithelial cells (figs. 6 and 7).

A description of similar lesions in the forestomach of the mouse has not been encountered in the literature. Wolfe and Salter (*6*) report no evident change in the stomachs of mice fed a vitamin A deficient diet for 120 days, although changes occurred in various other structures within 35 days.

An earlier publication described hypertrophy and hyperkeratosis of the forestomachs in old mice of strain I, but these conditions are not commonly seen in mice of the age (8 to 8.5 months) of those used in this investigation. It is essential to record that in a few instances papillomas similar to the one shown in figure 4 have been seen in the forestomachs of strain I mice maintained exclusively on dog chow. The occasional occurrence of hyperkeratosis and of papillomas in the forestomachs of mice kept on normal diets suggests that the changes found in mice of group B of this experiment are not specific for vitamin A deficiency. This view is in accord with that of Bessey and Wolbach (*3*) who, in a description of the pathology of vitamin A deficiency in the rat, state, "While in the rat hyperkeratosis of the forestomach is of frequent occurrence, it cannot be regarded as specific." Cramer (*4*) published studies of an extensive hyperplasia occurring in the forestomach of the rat and came to the conclusion that "unbalanced diets, especially diets deficient in vitamin A, may play a contributory part, but they are not the chief determining factor." While discussing the factors [2] which may influence the occurrence of the lesions, Cramer describes his experience with different

[2] The presence of hair balls in the stomach of the rat has been considered a factor in the occurrence of the lesion. In the experiment recorded here hair balls were found in the stomachs of two mice. One of these ate the vitamin deficient diet and the other the vitamin rich diet. The forestomach of the mouse fed the deficient diet is shown in figure 5. The forestomach of the mouse kept on the rich diet was normal.

stocks of rats and suggests that the strain of animal may be of considerable importance.

In the experiment reported here, mice of three inbred strains responded to a deficiency of vitamin A by developing hypertrophy and hyperkeratosis of the lining of the forestomach, but mice of strain I were more responsive than those of strains C_3H or M if the occurrence of papilloma is used as a criterion. Microscopic studies also disclosed a more extensive hyperkeratosis in strain M mice than in strain C_3H mice. Such observations mean that mice of different inbred strains vary in their response to a deficiency of vitamin A and suggest that strains of mice in which older animals have a tendency to develop lesions in certain structures similar to those elicited by vitamin deficiencies may be most responsive when fed deficient diets.

Finally, the use of inbred strains of mice as experimental animals has yielded results of exceptional interest in the study of infectious diseases as well as in the study of malignant growths and it is suggested that their use may also prove helpful in vitamin studies.

SUMMARY AND CONCLUSIONS

The adenomatous stomach lesion which occurs spontaneously in strain I mice did not occur in mice of other strains when they were kept in pens with strain I mice or when they were fed the lesion. Feeding tissues of the lesion to young strain I mice did not hasten its appearance or increase its degree of development in the young animals. It is concluded that the stomach lesion is not communicable and is not, apparently, caused by an infectious agent.

The lesion did not regress in older strain I mice fed a vitamin A rich diet and occurred in young strain I mice fed a diet rich in vitamin A. It is concluded that the lesion is not the result of vitamin A deficiency.

The lesion was more pronounced in young strain I mice kept on a dog chow diet which contained roughage than in those fed diets rich or deficient in vitamin A but which contained very little roughage. This suggests that the physical state of the diet may exert some influence upon the development of the lesion.

The vitamin A deficient diet caused hypertrophy and hyperkeratosis of the lining in the forestomachs of mice from three inbred strains but the strains varied in their responses to the deficient diet. The implication of this variation in response is discussed and it is suggested that inbred strains of mice may be of some use in the study of vitamins.

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STUDIES IN CHEMOTHERAPY

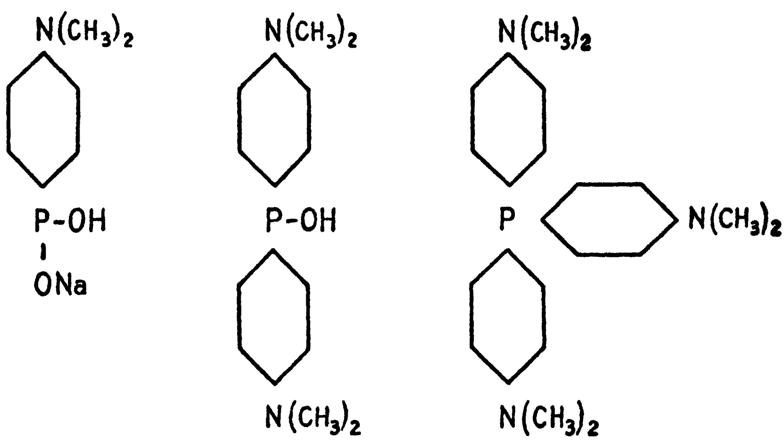
XI. Antibacterial Action of Phosphorus Compounds. Preliminary Report.

By Hugo Bauer, *Research Associate*, and Sanford M. Rosenthal, *Senior Pharmacologist, Division of Pharmacology, National Institute of Health, United States Public Health Service.*

In a previous report (*1*) it has been shown that sulfur is not essential to chemotherapeutic action. Compounds active against streptococci were obtained in which sulfur was replaced by arsenic, and some antipneumococcal activity was shown for 4-nitrobenzoic acid and related compounds.

Since the arsenic compounds were highly toxic, investigation was begun upon some analogous phosphorus derivatives. Preliminary results indicate that active phosphorus compounds with comparatively low toxicity can be obtained.

The following compounds were studied upon experimental streptococcal and pneumococcal infections in mice:



I II III

These compounds are known (*2*). They were prepared according to the method of Raudnitz (*3*). The sodium salt of 4-dimethylaminophenyl phosphonous acid (I) and tris (4-dimethylaminophenyl) phosphine (III) were inactive. The secondary compound bis (4-dimethylaminophenyl) phosphinous acid (II) administered by

Table 1.—*Antistreptococcal and antipneumococcal action of bis(dimethylaminophenyl) phosphinous acid (compound No. II) in mice (0.5 cc. of 10^{-6} dilutions of cultures injected intraperitoneally)*

Compound	Dosage (gm. per kilo)	Number of mice	Deaths (in days) 1	2	3	4	5	6	7	8	9	10	11–14	Mortality, percent	Organism
No. II	0.5×3 days oral	20	1	1		1	5	1		1			1	55	Streptococcus No. 1685, 10^{-6}.
Sulfanilamide	0.5×3 days oral	20				1	5		1			1	2	50	
Controls		12	12											100	
No. II	0.5×4 days oral	20			1			3	4					40	Streptococcus No. 1685, 10^{-6}.
No. II	0.5×4 days s. c.	20			1			4	2	1		1	1	50	
Sulfanilamide	0.5×4 days oral	20			3	1		3	1	3	1	1		65	
Controls		20	19	1										100	
No. II	0.25×2 days oral	15			3	5	2			2				80	Streptococcus No. 995, 10^{-6}.
Sulfanilamide	0.5×2 days oral	15					1	1	1			1	1	33	
Controls		15	12		1	1		1						100	
No. II	0.062×4 days oral	15		1	5	2	2	1				1		80	Streptococcus No. 995, 10^{-6}.
No. II	0.125×4 days oral	15			2	2	2	5	1				2	93	
No. II	0.25×4 days oral	15						3	2		1			40	
Sulfanilamide	0.5×4 days oral	15					1			1				13	
Controls		15	12			1	1		1					100	
No. II	0.7×4 days oral	15	1		10		1	1	1					93	Pneumococcus, Lederle I, 10^{-6}.
Controls		15	13		2									100	
No. II	0.25×3 days oral	15	5		8		1							93	Pneumococcus, Lederle I, 10^{-6}.
Controls		15	10		5									100	

mouth or subcutaneously was active against streptococcal infections in mice. The activity was equal to that of sulfanilamide (table 1).[1]

The effect upon pneumococcus (Type I) infections in mice, as with sulfanilamide, was much less pronounced.

The acute toxicity of these compounds for mice is shown in table 2. The maximum tolerated dose of compound II was 2 gm. per kilo orally or subcutaneously. For compound I orally it was greater than 8 gm. per kilo, and for compound III greater than 4 gm. per kilo. No evidence of delayed toxic effects has been seen.

The degree of activity of compound II, associated with the low toxicity of this class of compounds, warrants further study in various types of experimental infections. Related compounds, with particular reference to changes in the amino groups and in the valence of the phosphorus, are being investigated.

TABLE 2.—*Toxicity for mice of single doses of the phosphorus compounds. I was freely soluble in water. II and III were suspended in water for subcutaneous injection and in 5 percent acacia for oral administration*

Compound	Dosage (gm. per kilo)	Route	Number of mice	Deaths
I	1.0	Oral	5	0
	2.0	do	5	0
	3.0	do	5	0
	4.0	do	5	0
	6.0	do	5	0
	8.0	do	6	0
II	1.0	Oral	10	0
	2.0	do	15	0
	3.0	do	5	[1]2
	0.5	s. c.	5	0
	1.0	do	10	0
	2.0	do	10	[2]1
III	0.5	Oral	5	0
	1.0	do	5	0
	2.0	do	10	0
	3.0	do	5	0
	4.0	do	5	0
	1.0	s. c.	5	0
	2.0	do	5	0

[1] 6 hours.
[2] 4 days.

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[1] We are indebted to Dr. A. M. Patterson, Antioch College, for suggestions as to naming of these compounds.

DEATHS DURING WEEK ENDED NOVEMBER 4, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 4, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,765	7,926
Average for 3 prior years	[1] 7,911	
Total deaths, first 44 weeks of year	362,544	356,613
Deaths under 1 year of age	448	492
Average for 3 prior years	[1] 515	
Deaths under 1 year of age, first 44 weeks of year	21,916	23,144
Data from industrial insurance companies:		
Policies in force	66,594,578	68,302,390
Number of death claims	11,775	11,545
Death claims per 1,000 policies in force, annual rate	9.2	8.8
Death claims per 1,000 policies, first 44 weeks of year, annual rate	10.0	9.3

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 11, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934-38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934-38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934-38, median
NEW ENG.												
Maine	6	1	5	2	----	----	7	----	127	21	11	20
New Hampshire	0	0	0	0	----	----	----	----	41	4	1	1
Vermont	0	0	0	0	----	----	----	----	643	48	0	1
Massachusetts	8	7	2	2	----	----	----	----	123	105	115	65
Rhode Island	0	0	0	0	----	----	----	----	260	34	1	1
Connecticut	0	0	6	4	9	3	2	2	18	6	23	32
MID. ATL.												
New York [1]	6	15	14	28	[1]5	[1]7	[1]14	[1]10	68	171	137	139
New Jersey	27	23	4	16	5	4	3	6	10	8	11	26
Pennsylvania	14	27	41	41	----	----	----	----	16	31	60	78
E. NO. CEN.												
Ohio	52	68	91	56	4	5	----	5	6	8	14	56
Indiana [2]	22	15	31	33	9	6	12	19	10	7	10	10
Illinois	12	18	46	49	7	11	7	10	9	14	16	16
Michigan [2]	13	12	20	20	1	1	----	1	169	160	54	41
Wisconsin	2	1	3	5	53	30	42	36	47	27	60	59
W. NO. CEN.												
Minnesota	2	1	6	12	2	1	----	----	60	31	122	39
Iowa	38	19	18	13	----	----	5	2	12	6	20	6
Missouri	14	11	21	55	1	1	4	36	1	1	9	9
North Dakota	22	3	5	1	29	4	1	----	44	6	252	13
South Dakota	15	2	0	1	23	3	2	----	30	4	28	1
Nebraska	4	1	2	2	4	1	----	----	4	1	1	2
Kansas	6	2	10	16	17	6	5	2	98	35	5	4

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 11, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	1	—	—	—	—	0	0	3	3
Maryland [3]	22	7	9	14	12	4	5	7	9	3	23	10
District of Columbia	32	4	7	11	16	2	2	1	0	0	2	2
Virginia [3]	169	90	81	81	214	114	109	—	13	7	6	18
West Virginia	46	17	13	48	82	12	14	16	22	8	16	16
North Carolina [3]	206	141	89	96	3	2	—	4	108	74	157	38
South Carolina [3]	63	23	17	17	653	239	229	220	14	5	15	5
Georgia [3]	76	46	40	44	291	175	36	—	8	5	13	0
Florida [2, 3]	18	6	1	12	6	2	—	—	12	4	6	2
E. SO. CEN.												
Kentucky	31	18	41	41	7	4	51	10	3	2	12	36
Tennessee [3]	79	45	43	36	49	28	28	28	12	7	8	8
Alabama [3]	63	36	23	43	104	59	62	52	14	8	3	1
Mississippi [3]	88	15	24	24	—	—	—	—	—	—	—	—
W. SO. CEN.												
Arkansas	87	35	24	24	40	16	56	19	2	1	3	3
Louisiana	81	13	21	23	27	11	8	13	0	0	63	2
Oklahoma	24	12	7	14	107	53	21	25	0	0	7	3
Texas [3]	47	57	96	73	166	200	147	147	24	29	6	19
MOUNTAIN												
Montana	0	0	0	2	131	14	3	5	75	8	140	15
Idaho	0	0	0	0	—	—	3	8	51	5	29	17
Wyoming	22	1	0	2	—	—	—	—	327	15	2	2
Colorado	34	7	25	8	135	28	31	—	63	13	2	2
New Mexico	62	5	5	8	—	—	2	2	0	0	5	5
Arizona	12	1	2	2	564	46	55	37	12	1	5	2
Utah [3, 4]	10	1	1	1	30	3	2	—	228	23	34	14
PACIFIC												
Washington	22	7	0	3	3	1	1	1	644	209	21	24
Oregon	0	0	4	1	35	7	13	18	55	11	7	7
California [3]	19	23	28	49	10	12	28	27	91	111	209	152
Total	33	836	926	1,077	53	1,115	1,005	766	52	1,277	1,746	1,746
45 weeks	17	19,586	24,494	24,494	167	159,002	54,789	110,137	321	357,617	772,659	683,515

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	3	0	24	4	10	14
New Hampshire	0	0	0	0	0	0	0	0	20	2	1	4
Vermont	0	0	0	0	13	1	0	0	13	1	10	10
Massachusetts	1.2	1	0	0	2.4	2	0	2	54	46	76	126
Rhode Island	0	0	0	0	0	0	0	0	61	8	7	7
Connecticut	3	1	0	0	0	0	0	0	65	22	32	87
MID. ATL.												
New York [3]	1.6	4	2	6	9	23	3	5	54	135	222	294
New Jersey	1.2	1	0	1	6	5	0	1	74	62	86	54
Pennsylvania	2	4	2	4	7	13	2	4	123	242	178	331

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 11, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0	0	4	2	4	5	1	2	158	205	292	292
Indiana [3]	0	0	1	1	8	2	0	2	180	121	104	147
Illinois	0	0	0	3	1.3	2	0	4	163	248	215	382
Michigan [3]	2.1	2	0	1	6	6	2	3	256	242	278	206
Wisconsin	1.8	1	0	0	9	5	1	1	204	116	138	210
W. NO. CEN.												
Minnesota	1.9	1	0	0	16	8	0	1	165	85	63	94
Iowa	0	0	0	1	47	23	1	2	158	78	50	76
Missouri	0	0	1	2	1.3	1	1	2	50	39	86	86
North Dakota	0	0	0	0	0	0	0	0	175	24	24	40
South Dakota	15	2	0	0	30	4	0	0	240	32	28	28
Nebraska	0	0	0	0	0	0	0	1	57	15	8	21
Kansas	0	0	0	0	8	3	0	4	282	101	102	98
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	315	16	6	6
Maryland [3]	0	0	0	2	0	0	0	1	108	35	17	72
Dist. of Columbia	8	1	0	1	0	0	0	0	113	14	4	9
Virginia [3]	4	2	2	3	1.9	1	0	1	105	56	65	56
West Virginia	5	2	1	1	11	4	0	0	239	89	84	100
North Carolina [3]	0	0	0	1	4	3	1	1	140	96	112	90
South Carolina [3]	5	2	0	0	11	4	0	0	55	20	10	10
Georgia [3]	0	0	0	0	3	2	1	1	66	40	30	27
Florida [2,3]	0	0	0	0	6	2	0	1	24	8	4	6
E. SO. CEN.												
Kentucky	1.7	1	1	4	23	13	0	1	129	74	113	107
Tennessee [3]	4	2	2	2	0	0	0	1	176	100	76	71
Alabama [3]	0	0	2	2	1.8	1	0	1	83	47	34	23
Mississippi [3]	2.5	1	1	1	0	0	2	2	35	14	11	20
W. SO. CEN.												
Arkansas	2.5	1	0	0	2.5	1	1	1	27	11	16	16
Lousiana	7	3	1	1	2.4	1	0	1	56	23	23	17
Oklahoma	2	1	0	0	4	2	0	1	28	14	32	20
Texas [3]	4	5	0	1	3	4	1	4	32	39	71	71
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	309	33	22	37
Idaho	10	1	0	0	20	2	0	0	122	12	11	33
Wyoming	0	0	0	0	0	0	0	0	131	6	3	16
Colorado	0	0	1	0	14	3	0	0	154	32	41	42
New Mexico	0	0	0	0	37	3	0	0	99	8	6	25
Arizona	0	0	0	0	0	0	1	0	12	1	6	7
Utah [3,4]	0	0	0	0	50	5	0	0	248	25	12	29
PACIFIC												
Washington	3	1	0	0	3	1	1	3	219	71	18	43
Oregon	0	0	0	0	5	1	1	3	65	13	50	45
California [3]	0.8	1	1	2	18	22	0	11	95	116	184	180
Total	1.6	41	22	67	7	178	23	112	113	2,841	3,021	3,993
45 weeks	1.5	1,730	2,553	4,861	6	6,640	1,566	6,871	121	136,566	160,475	191,424

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Nov. 11, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934-38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases	1934-38, median	Nov. 11, 1939, rate	Nov. 11, 1939, cases	Nov. 12, 1938, cases
NEW ENG.											
Maine	0	0	0	0	6	1	2	2	266	44	62
New Hampshire	0	0	0	0	0	0	0	0	0	0	6
Vermont	0	0	0	0	13	1	1	0	952	71	75
Massachusetts	0	0	0	0	0	0	1	3	162	138	80
Rhode Island	0	0	0	0	8	1	0	0	160	21	24
Connecticut	0	0	0	0	0	0	1	1	214	72	74
MID. ATL.											
New York [1]	0	0	0	0	6	16	7	9	120	300	485
New Jersey	0	0	0	0	4	3	2	2	106	89	161
Pennsylvania	0	0	0	0	7	14	11	20	142	279	208
E. NO. CEN.											
Ohio	0	0	0	0	4	5	6	10	29	88	191
Indiana [2]	1	1	8	5	12	8	3	3	55	37	10
Illinois	0	0	3	1	5	7	6	17	106	161	553
Michigan [2]	16	15	6	1	1	1	3	6	108	102	194
Wisconsin	5	8	8	8	0	0	2	2	232	132	378
W. NO. CEN.											
Minnesota	4	2	6	6	6	3	0	0	110	57	16
Iowa	12	6	1	8	0	0	2	3	82	16	22
Missouri	0	0	8	2	3	2	5	7	14	11	11
North Dakota	0	0	0	1	7	1	7	1	29	4	4
South Dakota	8	1	0	0	8	1	0	0	45	6	9
Nebraska	4	1	1	1	0	0	0	0	27	7	1
Kansas	3	1	1	2	11	4	4	6	34	12	22
SO. ATL.											
Delaware	0	0	0	0	0	0	0	0	197	10	5
Maryland [2]	0	0	0	0	12	4	3	7	160	52	16
District of Columbia	0	0	0	0	32	4	0	1	57	7	13
Virginia [3]	0	0	0	0	9	5	3	10	111	59	20
West Virginia	0	0	0	0	30	11	7	7	27	10	23
North Carolina [3]	0	0	0	0	6	4	4	4	111	76	166
South Carolina [3]	0	0	0	0	16	6	3	3	25	9	21
Georgia [3]	0	0	0	0	5	3	2	7	13	8	4
Florida [2] [3]	0	0	0	0	6	2	0	0	30	10	4
E. SO. CEN.											
Kentucky	0	0	2	1	2	1	8	12	137	79	4
Tennessee [3]	0	0	0	0	12	7	2	9	115	65	24
Alabama [3]	0	0	0	0	7	4	2	3	21	12	28
Mississippi [2]	0	0	0	0	10	4	8	8			
W. SO. CEN.											
Arkansas	0	0	3	1	25	10	7	7	30	12	13
Louisiana	5	2	1	0	7	3	7	9	44	18	17
Oklahoma	2	1	1	4	16	8	3	15	4	2	5
Texas [3]	0	0	11	1	11	13	22	25	37	45	50
MOUNTAIN											
Montana	0	0	4	5	0	0	4	3	37	4	25
Idaho	0	0	1	1	10	1	4	2	0	0	4
Wyoming	0	0	1	1	0	0	0	0	153	7	10
Colorado	14	3	6	3	14	3	9	1	43	9	37
New Mexico	0	0	0	0	0	0	3	10	334	27	19
Arizona	0	0	0	0	0	0	4	1	12	1	1
Utah [2] [4]	0	0	0	0	0	0	1	0	1,063	107	21
PACIFIC											
Washington	0	0	1	22	12	4	8	3	59	19	31
Oregon	0	0	1	1	5	1	1	2	94	19	10
California [3]	0	0	5	1	25	30	7	13	47	57	82
Total	1	36	79	84	8	196	185	318	94	2,321	3,242
45 weeks	8	9,001	13,271	6,531	10	11,726	13,125	13,879	139	154,703	182,892

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 11, 1939, 76 cases as follows: Virginia, 1; North Carolina, 1; South Carolina, 4; Georgia, 41; Florida, 1; Tennessee, 13; Alabama, 6; Texas, 8; California, 1.
[4] Rocky Mountain spotted fever, week ended Nov. 11, 1939, Utah, 1 case.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
October 1939										
Arkansas	90	70	383	8	1	57	8	51	8	48
California	60	60	38	302	8	3	146	407	13	58
Maine	4	1		9	2		1	30	0	6
Michigan	80	32	15	134	8		152	700	1	48
New Jersey	36	30	1	30	3		27	215	0	17
Texas	107	572	368	105	6	88	36	128	1	117
West Virginia	88	45		11	8		16	843	0	30

October 1939

	Cases
Actinomycosis:	
California	1
Michigan	1
Botulism:	
California	1
Chickenpox:	
Arkansas	41
California	427
Maine	115
Michigan	575
New Jersey	393
Texas	34
West Virginia	137
Dengue:	
California	1
Texas	2
Dysentery:	
Arkansas (amoebic)	3
Arkansas (bacillary)	24
California (amoebic)	28
California (bacillary)	77
Maine (bacillary)	1
Michigan (amoebic)	10
Michigan (bacillary)	18
Michigan (unspecified)	2
New Jersey (amoebic)	1
New Jersey (bacillary)	2
Texas (amoebic)	8
Texas (bacillary)	119
West Virginia (bacillary)	4
Encephalitis, epidemic or lethargic:	
California	7
Maine	1
Michigan	1
New Jersey	2
Texas	2
Food poisoning:	
California	45
German measles:	
California	61
Maine	9
Michigan	28
New Jersey	24
Granuloma, coccidioidal:	
California	7
Hookworm disease:	
Arkansas	3
California	2
Jaundice, epidemic:	
California	15
Michigan	3
Leprosy:	
California	2
New Jersey	1
Texas	1
Mumps:	
Arkansas	20
California	626
Maine	5
New Jersey	299
Texas	26
Ophthalmia neonatorum:	
California	2
New Jersey	15
Texas	1
Psittacosis:	
California	2
Puerperal septicemia:	
Arkansas	2
Rabies in animals:	
Arkansas	15
California	23
Michigan	1
New Jersey	21
Relapsing fever:	
California	3
Texas	5
Rocky Mountain spotted fever:	
Michigan	1
New Jersey	1
Septic sore throat:	
Arkansas	27
California	7
Maine	1
Michigan	34
New Jersey	5
West Virginia	2
Tetanus:	
Arkansas	1
California	4
Maine	1
Michigan	4
New Jersey	2
Trachoma:	
Arkansas	21
California	21
Texas	5
Trichinosis:	
California	1
Tularaemia:	
Arkansas	2
Texas	5
Typhus fever:	
Arkansas	1
California	5
Texas	36
Undulant fever:	
Arkansas	1
California	22
Maine	2
Michigan	7
New Jersey	5
Texas	12
West Virginia	1
Vincent's infection:	
Maine	1
Michigan	26
Whooping cough:	
Arkansas	55
California	456
Maine	153
Michigan	419
New Jersey	357
Texas	116
West Virginia	82

WEEKLY REPORTS FROM CITIES

City reports for week ended November 4, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	232	101	31	424	489	973	6	335	42	974	--------
Current week [1]	123	63	18	216	327	611	0	307	42	713	--------
Maine:											
Portland	0	------	0	6	1	2	0	0	0	3	23
New Hampshire:											
Concord	0	------	0	1	1	0	0	0	0	0	11
Manchester	0	------	0	0	0	0	0	0	0	0	11
Nashua	0	------	0	0	0	0	0	0	0	0	8
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	7	9
Rutland	0	------	1	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	1	------	1	8	10	18	0	7	0	27	202
Fall River	1	------	0	0	0	0	0	1	0	6	24
Springfield	0	------	0	0	0	2	0	0	0	3	33
Worcester	0	------	0	0	5	1	0	2	0	7	52
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	13
Providence	0	------	0	42	6	3	0	0	0	8	60
Connecticut:											
Bridgeport	0	1	1	0	0	4	0	3	0	0	28
Hartford	0	------	0	1	0	6	0	1	1	37	46
New Haven	0	------	0	3	2	2	0	0	0	2	35
New York:											
Buffalo	1	------	0	5	8	7	0	8	0	0	181
New York	16	3	1	14	58	38	0	57	4	75	1,363
Rochester	0	2	0	2	1	0	0	0	0	20	62
Syracuse	0	------	0	0	4	6	0	0	0	12	41
New Jersey:											
Camden	4	------	0	0	2	4	0	0	0	1	35
Newark	0	1	0	1	4	9	0	4	0	32	78
Trenton	0	------	0	0	4	0	0	0	0	0	44
Pennsylvania:											
Philadelphia	1	------	1	2	13	24	0	21	1	63	427
Pittsburgh	6	------	1	2	9	30	0	3	0	6	140
Reading	0	------	0	0	1	0	0	0	0	4	10
Scranton	0	------	0	1	0	0	0	0	0	1	--------
Ohio:											
Cincinnati	10	------	0	0	8	7	0	5	0	8	136
Cleveland	3	12	0	1	7	22	0	9	1	42	186
Columbus	0	------	0	1	4	16	0	1	0	1	75
Toledo	0	------	0	9	2	7	0	5	1	15	63
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	4	10
Fort Wayne	1	------	0	0	2	0	0	1	0	1	25
Indianapolis	1	------	0	4	2	22	0	4	0	10	99
Muncie	0	------	0	0	8	3	0	0	0	0	7
South Bend	0	------	0	0	0	3	0	0	0	2	8
Terre Haute	1	------	0	0	0	2	0	1	0	0	19
Illinois:											
Alton	1	------	0	0	0	1	0	0	1	0	11
Chicago	9	7	0	9	23	85	0	32	2	67	631
Elgin	0	------	0	0	1	1	0	0	0	4	15
Moline	0	------	0	0	0	1	0	0	0	0	3
Springfield	------	------	------	------	------	------	------	------	------	------	------
Michigan:											
Detroit	7	------	0	6	7	56	0	11	0	32	204
Flint	0	------	0	0	1	6	0	0	0	8	17
Grand Rapids	0	------	0	2	1	7	0	0	0	2	22
Wisconsin:											
Kenosha	0	------	0	0	0	5	0	0	0	2	5
Madison	0	------	0	0	0	1	0	0	0	4	12
Milwaukee	0	------	0	4	4	23	0	2	0	14	97
Racine	0	------	0	0	0	1	0	1	0	0	22
Superior	0	------	0	0	0	0	0	0	0	0	6
Minnesota:											
Duluth	0	------	0	7	1	1	0	1	0	2	14
Minneapolis	1	------	1	2	9	20	0	0	0	8	100
St. Paul	0	------	0	0	4	6	0	0	0	28	48

[1] Figures for Barre, Vt., Springfield, Ill., and Wilmington, N. C., estimated; reports not received.

City reports for week ended November 4, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	------	0	------	1	0	------	0	0	------
Davenport	0	------	------	0	------	2	0	------	0	0	------
Des Moines	0	------	0	0	0	8	1	0	0	0	31
Sioux City	0	------	------	0	------	7	0	------	0	2	------
Waterloo	3	------	------	1	------	1	0	------	0	1	------
Missouri:											
Kansas City	0	------	0	3	5	14	0	7	1	0	89
St. Joseph	0	------	0	0	3	1	0	2	0	0	34
St. Louis	6	------	1	1	11	15	0	4	2	8	207
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	0	5
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	1	0	0	0	0	11
South Dakota:											
Aberdeen	0	------	------	0	------	1	0	------	0	0	------
Sioux Falls	0	------	0	0	0	3	0	0	0	0	7
Nebraska:											
Lincoln	0	------	------	1	------	2	0	------	0	2	------
Omaha	1	------	0	0	2	2	0	1	0	2	65
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	4
Topeka	0	------	0	0	0	4	0	0	0	0	25
Wichita	0	------	0	16	1	1	0	4	0	0	30
Delaware:											
Wilmington	0	------	0	2	0	3	0	0	0	6	26
Maryland:											
Baltimore	3	3	3	3	9	3	0	3	0	21	200
Cumberland	0	------	0	0	0	2	0	0	1	0	17
Frederick	0	------	0	0	0	3	0	0	0	1	3
District of Columbia:											
Washington	2	------	0	0	11	10	0	7	1	15	161
Virginia:											
Lynchburg	4	------	0	0	0	2	0	0	0	8	3
Norfolk	3	3	0	0	2	1	0	3	0	0	20
Richmond	0	------	0	0	0	2	0	3	0	2	52
Roanoke	2	------	0	0	0	1	0	0	0	0	11
West Virginia:											
Charleston	0	------	0	0	1	3	0	0	1	0	15
Huntington	4	------	------	0	------	1	0	------	0	0	------
Wheeling	0	------	1	2	2	5	0	1	0	1	20
North Carolina:											
Gastonia	0	------	------	0	------	1	0	------	1	0	------
Raleigh	1	------	0	0	2	4	0	1	0	0	14
Wilmington	------	------	------	------	------	------	------	------	------	------	------
Winston-Salem	1	------	0	0	1	6	0	0	0	0	23
South Carolina:											
Charleston	0	8	2	0	2	0	0	0	0	0	18
Florence	0	9	0	0	1	0	0	0	0	0	2
Greenville	0	------	------	0	------	0	0	------	0	0	------
Georgia:											
Atlanta	4	1	0	1	5	6	0	4	1	1	73
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	1	8	1	0	7	1	0	2	0	0	38
Florida:											
Miami	0	1	0	0	0	0	0	1	1	1	26
Tampa	0	------	0	0	0	0	0	0	0	0	13
Kentucky:											
Ashland	0	------	0	0	0	0	0	1	0	0	5
Covington	1	------	0	0	2	4	0	0	0	0	9
Lexington	0	------	0	0	0	0	0	1	2	0	18
Louisville	3	------	0	0	4	8	0	0	1	33	63
Tennessee:											
Knoxville	0	------	0	0	1	12	0	3	0	2	26
Memphis	0	------	0	0	2	7	0	5	4	21	91
Nashville	0	------	0	0	3	2	0	0	0	9	50
Alabama:											
Birmingham	4	5	0	0	2	3	0	2	1	0	53
Mobile	0	------	1	0	1	5	0	1	0	0	17
Montgomery	3	1	------	0	------	1	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	1	------	1	0	------	1	0	------
Little Rock	1	1	0	0	3	0	0	4	0	0	------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	4
New Orleans	6	1	1	0	7	1	0	10	0	9	137
Shreveport	1	------	0	0	6	2	0	2	0	0	49

City reports for week ended November 4, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Oklahoma:											
Oklahoma City	0	------	0	0	0	2	0	3	0	0	39
Tulsa	0	------	--------	0	-------	1	0	-------	0	0	--------
Texas:											
Dallas	6	------	0	0	4	2	0	5	0	1	53
Fort Worth	2	------	0	0	1	1	0	2	0	3	33
Galveston	4	------	0	0	0	0	0	0	0	0	12
Houston	2	------	0	0	3	0	0	14	1	0	77
San Antonio	0	------	0	1	4	0	0	4	1	0	55
Montana:											
Billings	0	------	1	0	0	0	0	1	1	0	9
Great Falls	0	------	0	0	2	3	0	0	0	0	12
Helena	0	------	0	0	0	0	0	0	0	0	1
Missoula	0	------	0	0	0	0	0	0	0	0	8
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	8
Colorado:											
Colorado Springs	0	------	0	0	0	5	0	0	0	0	13
Denver	3	------	0	2	4	4	0	6	0	3	85
Pueblo	0	------	0	0	0	2	0	1	0	0	12
New Mexico:											
Albuquerque	0	------	0	1	4	0	0	3	0	0	13
Utah:											
Salt Lake City	2	------	0	3	1	4	0	2	0	44	31
Washington:											
Seattle	0	------	0	3	3	1	0	3	1	7	77
Spokane	2	------	0	1	1	8	0	1	2	0	29
Tacoma	0	------	0	47	4	3	0	0	1	0	31
Oregon:											
Portland	0	------	0	2	1	7	0	2	0	3	81
Salem	0	------	--------	5	-------	0	0	-------	0	0	--------
California:											
Los Angeles	3	9	1	3	7	25	0	21	10	3	337
Sacramento	1	------	0	0	1	4	0	3	0	0	25
San Francisco	0	1	0	5	7	9	0	8	0	9	150

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases	State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Massachusetts:				South Dakota:			
Worcester	0	0	1	Aberdeen	0	0	1
New York:				Maryland:			
Buffalo	0	0	3	Baltimore	0	0	2
New York	2	1	4	Georgia:			
Rochester	0	0	1	Atlanta	1	1	0
Pennsylvania:				Kentucky:			
Philadelphia	1	0	3	Lexington	1	0	0
Pittsburgh	1	1	1	Arkansas:			
Ohio:				Little Rock	0	0	1
Columbus	0	0	1	Louisiana:			
Indiana:				Lake Charles	1	0	0
Indianapolis	0	0	1	New Orleans	1	1	0
Illinois:				Shreveport	0	2	0
Chicago	0	0	3	Oklahoma:			
Michigan:				Tulsa	0	0	1
Detroit	1	0	2	Texas:			
Flint	0	0	1	Houston	1	0	1
Wisconsin:				Colorado:			
Madison	0	0	1	Denver	0	0	2
Minnesota:				Pueblo	0	0	2
Minneapolis	0	0	5	Utah:			
St. Paul	0	0	3	Salt Lake City	0	0	1
Iowa:				Oregon:			
Des Moines	0	0	12	Portland	0	0	1
North Dakota:				California:			
Fargo	0	0	1	Los Angeles	0	0	3
				San Francisco	0	0	4

Encephalitis, epidemic or lethargic.—Cases: New York, 1; St. Louis, 1; Wichita, 3.

Pellagra.—Cases: Lynchburg, 1; Charleston, S. C., 2; Florence, 1; Savannah, 1; New Orleans, 1; Dallas, 1; Sacramento, 1.

Typhus fever.—Cases: New York, 1; Atlanta, 3; Savannah, 1; Mobile, 4; New Orleans, 1; Los Angeles, 1.

FOREIGN REPORTS

AUSTRALIA

Infectious diseases—1938.—During the year 1938, cases of certain infectious diseases were reported in Australia as follows:

Disease	Cases	Disease	Cases
Anthrax	1	Malaria	6
Beriberi	5	Measles	103
Cerebrospinal fever	45	Poliomyelitis	2,698
Chickenpox	9	Psittacosis	2
Coastal fever	6	Puerperal fever	430
Dengue	115	Scarlet fever	5,932
Diphtheria	8,831	Tetanus	10
Dysentery	25	Trachoma	41
Erysipelas	81	Tuberculosis	3,572
Filariasis	2	Typhoid fever	315
Hookworm disease	14	Typhus fever	102
Influenza	178	Undulant fever	5
Leprosy	12	Weil's disease	8
Lethargic encephalitis	18	Whooping cough	248

CANADA

Provinces—Communicable diseases—Week ended October 28, 1939.—During the week ended October 28, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	1					2
Chickenpox		12		150	146	26	34	73	49	490
Diphtheria			5	63	4	7	6	3		88
Dysentery				3	1					4
Influenza		35			3	1			26	65
Measles		4		194	140	2	1	1	44	386
Mumps				8	37	2	1	2	11	61
Pneumonia		8			13	1	1		12	35
Poliomyelitis		3	1	2	9	1				16
Scarlet fever		6	22	84	122	30	5	18	22	309
Trachoma						14			10	24
Tuberculosis		20	35	54	52	5	25	1		192
Typhoid and paratyphoid fever		1		15		5	6	1		28
Whooping cough		41		91	53	26	14	18	16	259

NOTE.—No cases of the above diseases were reported in Prince Edward Island for this period.

FINLAND

Communicable diseases—September 1939.—During the month of September 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	283	Poliomyelitis	6
Dysentery	1	Scarlet fever	378
Influenza	1,140	Typhoid fever	20
Paratyphoid fever	121		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From the medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended— August 1939 5	Aug. 12	Aug. 19	Aug. 26	September 1939 2	Sept. 9	Sept. 16	Sept. 23	Sept. 30	October 1939 7	Oct. 14	Oct. 21	Oct. 28
Afghanistan	C					[1] 214		[1] 122				19			17			
	D				82	99		45			[1] 58							
Kandahar Province	C							101		[1] 107								
Greshk	C				5													
Tchakhansour	C				P													
Ceylon: Batticaloa	C				1									2	2	2		
China:																		
Canton	C		9															
	D		6															
Fatshan	C		P															
	D		154															
Hainan Island	C		P															
Hankow	C				P													
Honan	C		P															
Hong Kong	C		25	113	214	26	75	52	36	17	5	12	18	27	21	11	11	4
	D		19	80	136	20	54	33	18		7		8		15			
Macao	C	1	20	59	403	20	17	17		11		17	21	26	25	17	31	16
	D		12	33	188	9	7	6		9								
Shanghai	C			1	2		1	[2] 2		36	64	93	71	60	22	22	29	19
Tientsin	C					1												
Tsinan	C													3				
Tsingtao	C													P				
Whampoa	C		P															
India	C	11,896	7,117	6,638	18,349	5,045	5,138											
	D	5,502	3,337	2,877	8,283	2,450	2,520											
Akyab	C		1	1	[2] 1													
Allahabad	C		1	[2] 1	24		12	15	12	10	2	6	2	1	1	1		
Assam	C	220	405	321	76	9		2	7	6		5			2			
	D	105	156	117	32	2		1	5	3		5			1			
Bassein	C	2	6	5														
Bengal Presidency	C	8,754	3,193	2,040	3,732	593	578	469	446	454	420	377			403			
	D	4,174	1,504	874	1,578	324	359	284	281	272		222			213			

Bihar Province	C		584	263														
	D		284	107														
Bombay Presidency	C	157	196	98	1,139	302	332	290	191									
	D	61	83	37	429	100	117	88	68									
Burma	C						10	26	7	16								
	D						10	24	7									
Calcutta	C	963	821	593	636	27	33	21	9	13	11	14	12	15	19	12		
Cawnpore	C	3	4	10	5	6	18	29	41	18	9	11	7	5	12	3		
	D		2	4	4	2	3	11	12									
Central Provinces and Berar	C	184	194	34	79	49	86	203	262		180	488	382	306	351	205		
Chittagong	C	12	9	3	13	1	2	2	2	1	1	1	5		2			
Delhi	C				1		2							1				
	D	1					2											
Howrah	C	785	420	257	311	40	36	31	16	8								
Madras Presidency	C	84	60	66	200	62	31	6	8	6								
	D	30	24	13	70	21	8	4	3	3								
Madras	C			1														
Orissa Province	C	161	111	173	719	150	106	283	197	387	527	658	891	976	868	653		
Punjab	C					1			5	2								
Rangoon	C	4	9	4														
Sind State	C										6	6						
India (French):																		
Chandernagor Territory	C	22																
Pondichery Territory	C	1																
Indochina (French): Tonkin Province	C				1													
Iran:																		
Khorassan	C				371	30												
Zabol	C				34													
Iraq: Basra	C								[3] 1									
Japan: Osaka	C															[2] 1		
Thailand:																		
Bangkok	C	4	1											1	1			
Smud Prakar Province	C	13																
On vessels:																		
S. S. *Erinpura* at Rangoon from Calcutta	C		1															
S. S. *Amra* at Calcutta from Rangoon	C			1														
S. S. *Tin How* at Singapore from Hong Kong	C				1													
S. S. *Easi* at Hong Kong from Calcutta	C				1													

[1] For 2 weeks. [2] Imported. [3] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE [1]

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended— August 1939 5	August 1939 12	August 1939 19	August 1939 26	September 1939 2	September 1939 9	September 1939 16	September 1939 23	September 1939 30	October 1939 7	October 1939 14	October 1939 21	October 1939 28
Argentina (see also table below)	C				2													
	D				2													
Belgian Congo	C		18		1	1				5	2	2	2			[3] 8		10
Brazil. (See table below.)																		
British East Africa:																		
Nyasaland	C				2													
Uganda	C	17	17	25	61	4	12	5	4									
	D	17	17	25	55	3	11	5	4									
China: Manchuria.[2] (See also table below.)																		
Dutch East Indies:																		
Java—																		
Batavia	C							[4] 1										
Batavia Residency.[5]																		
Java and Madura	C	167	94	37	130			28										
	D	165	94	37	130			28										
Ecuador (see also table below):																		
Chimborazo Province	C	[6] 18																
Guayaquil	C	2																
	D	2																
Egypt: Asyut Province	C	35	10	2														
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector			1		1						2			1	1			
Honokaa		1																
Kapulena		2		1														
Paauhau Sector					3					1		1						
Paauilo				1														
India	C	10,527	770	72	291	506	432											
	D	3,118	524	35	152	295	266											
Bassein	C			1	2	1					2							
Plague-infected rats									2			2						
Bihar Province	C		12															
	D		9															
Bombay Presidency	C	46	11	6	24	16	45	33	33									
	D	23	8	2	11	10	19	20	16									
Burma	C				44		4	15	21	32								
	D				36		9	14	19									

Calcutta	C	1																
Calicut	C		1											2	1			
Central Provinces and Berar	C	1,914	198	6	7	10	31	31	65	47	76	140	130	135	148	137		
Coorg Province	C	4	1	1	2													
Madras Presidency	C	15	14	14	12	10	4	1	3	7								
	D	8	8	6	2	3	3			2								
Rangoon	C			1					1							1		
	D			1					1									
Indochina:																		
Cambodia	C			1														
Pnom Penh	C	1																
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Thailand:																		
Bichitr Province	C		4															
	D		1															
Prae	C	3																
Tunisia: Tunis	C	1																
Union of South Africa	C	9							6		4							
Cape Province	C	4	1															
Orange Free State	C	7																
United States.[7]																		

Place		April 1939	May 1939	June 1939	July 1939	August 1939	September 1939
Argentina (see also table above):							
Jujuy Province	C						1
Mendoza Province	C				1		
San Luis Province	C				1		
Brazil:							
Alagoas State	C	1					
[4] Pernambuco State	C	6					
Sao Paulo State	C	1					
China: Fukien Province	C				[8] 467		

Place		April 1939	May 1939	June 1939	July 1939	August 1939	September 1939
Ecuador (see also table above):							
Guayaquil and vicinity—Plague-infected rats					41		
Madagascar (central region)	C	33	16	12	21	25	
	D	25	14	12	19	22	
Peru	C	11	11	3	7	2	
Lambayeque Department	C	1	1				
Libertad Department	C	2	3	1		2	
Lima Department	C	1		1	7		
Piura Department	C	7	7	1			

[1] Including plague in the United States and its possessions.

[2] For 2 weeks.

[3] Information dated May 5, 1939, states that 34 cases of plague with 8 deaths had occurred in Hsinking, Manchuria, since the beginning of the year. Report dated Aug. 26, 1939, states that up to the beginning of August, 12 deaths from plague occurred in Kailu, in the eastern part of Hsingan West Province, and that up to Aug. 15, 1939, 51 deaths from plague occurred in Kirin Province, Manchuria.

[4] Imported.

[5] A report dated July 10, 1939, states that up to July 6, 1939, 84 deaths from pneumonic plague occurred in Batavia Residency, Java, Dutch East Indies.

[6] Includes 11 cases of pneumonic plague.

[7] Last reported human case, Aug 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1939: *California*—Ground squirrels, April; insects, June and Sept. 30; *Idaho*—Insects, June 14; *Montana*—Ground squirrels, July 15; insects, July 15 and 17; *Nevada*—Insects, April; *New Mexico*—Kangaroo rat, Apr. 15; *Oregon*—Ground squirrels, June; insects, May and June; *Washington*—Rabbit, May; insects, April and May; *Wyoming*—Insects, July 3.

[8] Includes 92 cases of pneumonic plague.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended—												
						August 1939				September 1939					October 1939			
						5	12	19	26	2	9	16	23	30	7	14	21	28
Algeria: Oran Department	C	1	2	1	2													
Angola. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
Brazil: Porto Alegre	C		7	6														
British East Africa:																		
Nairobi	C			26														
Nyasaland	C				1	1		7	9	1	4							
Tanganyika	C	146	9	48	19	4	27											
Canada:																		
Alberta	C			22														
Manitoba	C	13	2	1	1													
Saskatchewan	C			1	1													
China (see also table below):																		
Dairen	C	4	5	2	2													
Foochow	C	8	12	8	13	5		4	5									
Hong Kong	C	34	11	1	2													
	D	26	11	1	1													
Shanghai	C	50	18	8	3		1											
Swatow	C	7																
Tientsin	C	4	1	1														
Chosen (Korea). (See table below.)																		
Colombia (see also table below). Cartagena	D	1			1										3	3	5	
Dahomey. (See table below.)																		
Dominican Republic	C					1												
Ecuador: Guayaquil	C	1		3	1													
	D	1		1														
Eritrea: Massaua	C			1	1													
French Equatorial Africa:																		
Brazzaville	C						31											
Chad	C	14																
French Guinea	C				40													
Gold Coast	C				45													
Accra	C				1													
Greece. (See table below.)																		
Guatemala. (See table below.)																		

India	C	18,580	17,603	11,499	8,220	1,078	959											
	D	4,895	4,051	3,009	2,156	308	267											
Allahabad	C		1		1													
Assam	C	225	252	127	72	12	22	19	52	15	18	22			7			
Bengal Presidency	C	3,305	1,626	781	669	49	77	48	46	93	62	49			37			
	D	1,242	605	295	240	21	28	18	10	29		22			15			
Bihar Province	C		2,360	672														
Bombay Presidency	C	6,398	4,061	2,809	1,924	315	273	307	232									
	D	961	598	415	423	67	52	63	47									
Bombay	C	61	41	40	50	9	8	6	5	3		2	1	1	2			
	D	20	17	21	32	8	4	3	2									
Burma	C				8		6	3	9	7								
	D				3		5		3									
Calcutta	C	910	298	127	112	12	3	5	2	5	1	3	3	1	1			
	D	676	235	95	77	10	1	5	1	3		1						
Calicut	C												1		1			
Cawnpore	C	14	16	3														
Central Provinces and Berar	C	1,132	904	757	367		52	47	27	23	3	37	1	10	9	5		
Cochin	C	3		1														
Delhi	C	187	203	99	34	7	2	3	2	1		1	3			1		
Howrah	C	222	103	87	73	3	5	2	4	18								
Jodhpur	D		38	7	14			2			1	1			1			
Karachi	C	3	8	1	6	2	1	3	1	1	3		1		1			
Madras Presidency	C	1,020	545	465	705	149	216	140	133	121								
	D	241	155	102	128	39	38	28	30	15								
Madras	C	193	32	12	13	1	4	5	1	1	3	2		1				
Negapatam	C					1					1							
Northwest Frontier Province	C	110	86	165	95	7	3	1	10	9	7	8	9	29	9	4		
Orissa Province	C	1,039	722	376	391	52	68	231	159	98	167	118	106	138	130	81		
Punjab	C	191	214	214	80				1	5	6				1			
Rangoon	C	10	14	10	4	2	5		9	7	3		2	14	10			
Sind State	C	251	209	131	173	13	16	51	4	14	3		27	9	18	7		
Vizagapatam	C	6																
India (French):																		
Chandernagor Territory	C	4	3		2													
Pondichery Territory	C	3			10													
	D	2			5													
Indochina (French) (see also table below):																		
Tonkin Province	C	228	135	54	3													
Hanoi	C	13	22	3	3													
Saigon-Cholon	C														1			
Iran	C	10	3	3														
Teheran	D				6			1					9					
Iraq	C	6		6														
Baghdad	C		[1] 1															
Japan:																		
Nagoya	C				1	1												
Osaka	C	1	5	1														
Taiwan:[2]																		
Tokyo	C	1																

[1] Imported.
[2] Information dated Apr. 6, 1939, states that up to Mar. 31, 61 cases of smallpox were reported in Taiwan, Japan.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended— August 1939 5	12	19	26	September 1939 2	9	16	23	30	October 1939 7	14	21	28
Mexico (see also table below):																		
Mexico, D. F.	C	3	3	5	3	1					2							
Monterrey	C	1					1								1		1	
San Luis Potosi	D	1	1	4	1									1				
Tampico	C	1						1										
Morocco. (See table below.)																		
Mozambique	C	11	32	1	1													
Nigeria	C	1, 261	514	76	116	11	53	8	11	58	25							
Calabar	C	3	44		1			1	1	1								
Lagos	C		4				1											
Port Harcourt	C			[1]1						1								
Niger Territory. (See table below.)																		
Northern Rhodesia	C										1	6						
Portugal (see also table below):																		
Lisbon	C	34	33	53	32	3	15	11	10	12	8	14	17	8	4	6		
Oporto	C	2	8	10	12			1			1				1			
Portuguese Guinea. (See table below.)																		
Senegal. (See table below.)																		
Sierra Leone	C	8	20				[2]2				[3]4		[2]1					
Society Islands: Tahiti	C				12													
Southern Rhodesia	C	21	11	3						6			3					
Spain (see also table below):																		
Barcelona	C				5													
Malaga	D				5				1			3	1	2	2			
Seville	D															[2]1		
Valencia	C			1		4	3	3	2	1		7			5	2	1	3
Sudan (Anglo-Egyptian)	C	90	12	15	23	5	74	11	16	9	5			4				
Thailand	C	2		1	3	1			1									
Bangkok	C				1													
Nan Province	C				24										70			
Turkey. (See table below.)																		
Union of South Africa. (See table below.)																		
Venezuela. (See table below.)																		

On vessels:

S. S. *Mau Sang* at Sandakan from Hong Kong	1 case	Apr. 6, 1939
S. S. *Thistleglen* at Singapore	1 case	Apr. 10, 1939
S. S. *Empress of Russia* at Hong Kong from Shanghai	2 cases	Apr. 20, 1939
S. S. *Liebenfels* at Rangoon from Moulmein	1 case	June 2, 1939

On vessels—Continued.

S. S. *City of Pittsburgh*, Manila, P. I.	1 case	June 28, 1939
S. S. *Atalaya* at New Orleans	1 case	July 25, 1939
S. S. *Saturnia* at Jamaica, N. Y., from Lisbon	1 case	Aug. 3, 1939
S. S. *Erinpura* at Rangoon from Madras	1 case	Aug. 7, 1939

Place		April 1939	May 1939	June 1939	July 1939	August 1939	September 1939
Angola	C				[4] 36		
Belgian Congo	C		169	199			
Bolivia:							
Cochabamba Department	C	1		9	6		
La Paz Department	C	4	4	1			
Oruro Department	C	2		4	14		
Potosi Department	C						
Santa Cruz Department	C		2		1		
China: Harbin	C	5	1	1			
Chosen (Korea)	C				7	1	
Colombia (see also table above)	C	494	437	375	137	161	
Dahomey	C				8		
Ecuador: Guayaquil and vicinity	C			5			
Greece	C	7	11				
Guatemala	C	4					
Indochina (French) (see also table above)	C	603	671	178	103	149	93
	D	52	109	31	21	30	19
Mexico (see also table above):							
Aguascalientes State	D			[5] 3		[6] 5	
Chiapas State	D					[6] 1	
Chihuahua State	D			[5] 5		[6] 1	
Coahuila State	D			[5] 2	7		
Durango State	D					[6] 4	
Guanajuato State	D			[5] 246		[6] 270	
Guerrero State	D			[5] 3		[6] 3	
Hidalgo State	D			[5] 13		[6] 9	
Jalisco State	D			[5] 4		[6] 3	
Mexico, D. F.	D	3		5		1	

Place		April 1939	May 1939	June 1939	July 1939	August 1939	September 1939
Mexico—Continued.							
Mexico State	D			[5] 146		[6] 41	
Michoacan State	D			[5] 137		[6] 79	
Morelos State	D			[5] 9		[6] 1	
Nayarit State	D			[5] 2			
Nuevo Leon State	D			[5] 1		[6] 2	
Oaxaca State	D			[5] 1		[6] 1	
Puebla State	D			[5] 20		[6] 32	
Queretaro State	D			[5] 34		[6] 31	
San Luis Potosi State	D			[5] 22		[6] 19	
San Luis Potosi	C			8	9		
	D			5	1		
Sinaloa State	D			[5] 7		[6] 1	
Tlaxcala State	D					[6] 2	
Vera Cruz State	D					[6] 1	
Zacatecas State	D			[5] 27		[6] 16	
Morocco	C		6				
Niger Territory	C	9		3			
Portugal (see also table above)	C	108			79	180	
	D	9			3	7	
Portuguese Guinea	C	115		7			
	D	8					
Senegal	C	42	55	25	24	2	3
Spain (see also table above)	C		49		31	59	
Turkey	C	59	34				
Union of South Africa: Transvaal	C			81	56		
Venezuela	D	3	7	6	2		19
Caracas	C				1	22	11

[1] Imported.
[3] For 2 weeks.
[4] June and July.
[5] May and June.
[6] July and August.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939					August 1939				September 1939					October 1939		
					1	8	15	22	29	5	12	19	26	2	9	16	23	30	7	14	21
Algeria:																					
Algiers Department	C	21	26	74	18			21	6	7	4	12	7	6	35	1	20				
Algiers	C	5	22	14	2			4													
Constantine Department	C	195	188	198	33			78	13	11	10	2	3	3	3		1	21			
Bone	C	.9	1					1													
Constantine	C	39	52	34	6			51	6	6											
Philippeville	C	2	9	6				1													
Oran Department	C	31	28	39	7			1	2	4	5					1					
Southern Territories	C	13	62	21																	
Australia:																					
Brisbane	C			1	1											1					
Queensland	C	5	1				4														
Bolivia. (See table below.)																					
British East Africa: Kenya	C	1																			
Bulgaria. (See table below.)																					
Chile	C	28	49	190	106	115	114	3	8	90	67										
Antofagasta Province	C	2	5	5	6			1		1											
Bio Bio Province	C	2																			
Concepcion Province	C						2														
Curico Province	C		1		1																
Nuble Province	C	7					2	1		1	3										
Santiago Province	C	14	37	102	92	113	104	1	1	84	59										
Valdivia Province	C	1	1	5						1											
Valparaiso	C	1	1			1		1	3	1		1				3		1			
China (see also table below):																					
Dairen	C		2					2		3	2					1					
Hankow	C		1	1																	
Shanghai	C		2	12	7	14	8	10	10	9	9	6	11	10	16	9					
Tientsin	C	3	1																		
Chosen (Korea). (See table below.)																					
Egypt:																					
Alexandria	C	13	26	12		1	2		1		1		1					1			1
Asyut Province	C	14	15	5			1			1				1	1						
Beheira Province	C	109	64	21	8	7	15	1	2	9	2	3	3		3						

Beni Suef	C		1						1	1			1								
Cairo	C	37	9	5				1					2							1	
Dakahliya Province	C	178	196	141	31	23	11	10	2	4	8	3			1						
Faiyum Province	C	7													1						
Gharbiya Province	C	355	216	112	18	26	48	30	8	4	3	6	4	4	7						
Girga Province	C	42	31	26	3	1	1	1	1	2		2		2	3						
Giza Province	C	53	22	28																	
Kalyubiya Province	C	44	45	26						4	1				1						
Minufiya Province	C	96	141	65	12	27	11	5	3	6	3	5	2		1						
Port Said	C										3										
Qena Province	C	127	21	6						1											
Sharkiya Province	C	66	24	24	3	2	1	3	1	2											
Suez	C													1	1					1	
Provinces	C	1,110	828	461	75	92	92	53	18	38	21	18	10	8	22	6	2	6	1	5	4
Eritrea: Hamasien	C			5																	
Guatemala. (See table below.)																					
Hawaii Territory: Honolulu	C		1	1				1	2		1		1			2	4	6	3	1	2
Hungary	C	9				1											3				
India: Coorg Province	C	3		3															4		
Iran	C	1	18	13																	
Tabriz	C			10			4			1	1	10					2				
Iraq	C				2	1		1	1												
Arbil Province	C		1	4						4											
Baghdad	C	3	2	1	2	1		1	1	1			2	4		1					
Kirkuk Province	C		7																		
Irish Free State: Louth County—Drogheda	C				5																
Latvia. (See table below.)																					
Lithuania. (See table below.)																					
Mexico (see also table below):																					
Guadalajara	D														1				1		
Mexico, D. F.	C	5	13	21	4	9	7	6							7						
Monterrey	C		1	3			3		2			1			1	1		1			
Saltillo	C			1																	
San Luis Potosi	D	1	1																	1	
Torreon	D	2	1					4												1	
Morocco	C	193	145	87	10	5	6			3									3		
Casablanca	C	12		1	1																
Nigeria: Kano Province	C								[1] 1												
Palestine:																					
Haifa	C	2	4	3	1		1		1			1	2		4	3	1		4	4	4
Jaffa	C	1	2	3	5		1		1	1			5	4		6	4		5	8	
Panama Canal Zone. (See table below.)																					
Peru. (See table below.)																					

[1] Suspected.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Mar. 26–Apr. 29, 1939	Apr. 30–May 27, 1939	May 28–June 24, 1939	Week ended— July 1939					August 1939				September 1939					October 1939		
					1	8	15	22	29	5	12	19	26	2	9	16	23	30	7	14	21
Poland	C	736	437	327	60	46	43	23	16	24	18										
	D	34	12	13	2	2	1	1		1	1										
Portugal: Oporto	C	3																			
Rumania. (See table below.)																					
Spain. (See table below.)																					
Straits Settlements: Singapore	C	1																			
Syria: Lebanese Republic	C	2																			
Trans-Jordan	C	8	9	1	1																
Tunisia:																					
Tunis	C	89	30	18	5	9	1	14	1	1	2	3	1								
Provinces	C	1,073	1,006	967	333	202	181	158	124	109	52	44	20				[2] 31				
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Venezuela. (See table below.)																					
Yugoslavia	C	115	62	35		5	17	2	2	1	4				2	3	2	3			
On vessels:																					
S. S. *Stanbrook* at Mers el Kebir	C	1																			
S. S. *Normandie* at Plymouth	C				1																

Place		April 1939	May 1939	June 1939	July 1939	August 1939	September 1939
Bolivia:							
De Beni Department	C				2		
La Paz Department	C	10	11	7	4		
Oruro Department	C	1	1		3		
Potosi Department	C	11	2	4	2		
Santa Cruz Department	C		2		1		
Bulgaria	C	14		8		16	
China: Manchuria—Harbin	C	4	16	14			
Chosen (Korea)	C		290	156	22	32	
Guatemala	C	14	4	8	9	21	46
Latvia	C	1					
Lithuania	C	23	6		10		
Mexico (see also table above):							
Aguascalientes State	D			[3] 4		[4] 4	
Chihuahua State	D			[3] 1			
Coahuila State	D			[3] 2		[4] 5	
Durango State	D			[3] 2		[4] 4	
Guanajuato State	D			[3] 7		[4] 12	
Guerrero State	D			[3] 2			
Hidalgo State	D			[3] 15		[4] 19	
Jalisco State	D			[3] 3		[4] 7	
Mexico, D. F	C			27	31		
	D	3		11	5	[4] 9	
Mexico State	D			21		[4] 17	
Michoacan State	D			[3] 10		[4] 5	
Mexico—Continued.							
Nuevo Leon State	D					[4] 1	
Oaxaca State	D			[3] 22		[4] 16	
Puebla State	D			[3] 24		[4] 24	
Queretaro State	D			[3] 4	1	[4] 1	
San Luis Potosi State	D			[3] 2		[4] 2	
Sonora State	D			[3] 2		[4] 1	
Tabasco State	D			[3] 1			
Tlaxcala State	D			[3] 2		[4] 3	
Vera Cruz State	D			[3] 3		[4] 3	
Yucatan State	D					[4] 1	
Zacatecas State	D			[3] 17		[4] 14	
Panama Canal Zone	C		1	1			1
Portugal	C				5		
Rumania	C	28	40	75	13	7	
Spain	C	4	14	9	7		
Turkey	C	62	49	35	15	12	
Istanbul	C	4		3			
Union of South Africa:							
Cape Province	C	32	127		132		
Natal	C	35	7	7	12		
Orange Free State	C	4	4	4	5		
Transvaal	C	16	13	13	12		
Venezuela: Bolivar	C	1	3			3	

[2] For 4 weeks.
[3] May and June.
[4] July and August

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Mar. 26-Apr. 29, 1939	Apr. 30-May 27, 1939	May 28-June 21, 1939	Week ended— July 1939					August 1939				September 1939					October 1939		
					1	8	15	22	29	5	12	19	26	2	9	16	23	30	7	14	21
Brazil:[1]																					
Amazonas State	D						[3] 1														
Bahia State	D								[3] 1												
Espirito Santo State	D	28	[3] 1																		
Minas Geraes State	D	2																			
Para State	D		[3] 1			1	1														
Cameroon: Bafia	C									[3] 1											
Colombia: Antioquia Department:																					
Caracoli	D			1				1													
San Carlos	D				1			1						1		1				1	
Dahomey: Bohicon.[4]																					
French Equatorial Africa:																					
Bangui	C															[5] 1					
Gabon	D						1														
French Guinea	C			2																	
Gold Coast	C	1		1																	
Ivory Coast [6]	C	3	[7] 5	[8] 9																	
Nigeria	C							1					[5] 1							1	
Niger Territory:																					
Dosso.[9]																					
Konni Circle	C			3																	
Tahua	C		[5] 1																		

Senegal:																					
Bambey	C			1																	
Dakar.[10]																					
Diourbel	C			6																	
Ziguinchor	C			10																	
	D			5																	
Sudan (French): Bandiagara	C			1																	
Togo (French mandate): Anecho	C																				1

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type.
[3] Exact date not given.
[4] The suspected case of yellow fever in Bohicon, Dahomey, published on pages 1910 and 1963 of the PUBLIC HEALTH REPORTS, was not yellow fever
[5] Suspected.
[6] During the week ended Nov. 4, 1939, 1 suspected case of yellow fever was reported in Abengourou, Ivory Coast.
[7] Includes 1 suspected case.
[8] Includes 4 suspected cases.
[9] During the week ended Nov. 11, 1939, 1 suspected case of yellow fever was reported in Dosso, Niger Territory.
[10] During the week ended Nov. 4, 1939, 1 suspected case of yellow fever was reported in Dakar, Senegal, as being imported from Tivaouane.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

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Public Health Reports

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RIBOFLAVIN DEFICIENCY IN MAN (ARIBOFLAVINOSIS)[1]

By W. H. SEBRELL, *Surgeon*, and R. E. BUTLER, *Passed Assistant Surgeon, United States Public Health Service*

Many of the early writers on pellagra (*1*) recognized that certain symptoms of the disease sometimes occurred without the skin lesions, and the term "pellagra sine pellagra" was introduced to designate these symptoms. In 1912 Stannus (*2*), in describing pellagra in Nyasaland, particularly noted lesions in the angles of the mouth which he called "angular stomatitis." Similar lesions with various other symptoms have been described by numerous other observers. In 1928 Jenner Wright (*3*) in Sierra Leone described lesions at the mucocutaneous junction associated with nervous system lesions which were cured by cod liver oil and yeast. Lesions which appear to be similar in many respects have been seen by Fitzgerald (*4*) (1932) in an Assam prison; Moore (*5*) (1934) in school children in Nigeria; Landor and Pallister (*6*) (1935) in the prisons of Singapore and Johore, and Aykroyd and Krishnan (*7*) (1936) in school children in South India.

As early as 1918 Goldberger, Wheeler, and Sydenstricker (*8*) suggested that two different dietary factors may be involved in pellagra, and in 1925 Goldberger and Tanner (*9*), in their experiments with casein, noted that the patients developed a dry, glazed vermilion border of the lips, erosions at the angles of the mouth, reddening of the lips, and seborrhea about the nose. They diagnosed these lesions as pellagra sine pellagra. They also saw in some a pasty, caseous accumulation in the nasolabial folds which cleared up when dried yeast was added to the diet.

In 1933 Wheeler (*10*) saw similar lesions in connection with the use of a haddock diet and discusses at some length the possibility of these symptoms being a different condition from pellagra as characterized by the typical dermatitis. He was unable to conclude definitely, however, whether the lesions were due to a marginal deficiency

[1] From the Division of Chemistry, National Institute of Health.

in the pellagra-preventive factor, or to a deficiency in some other vitamin.

In 1938 Sebrell (*11*) discussed the possibility of clinical pellagra being a multiple deficiency, and pointed out that riboflavin deficiency might occur in man simultaneously with, or independently of, pellagra. Therefore, in view of the uncertainty existing in regard to the etiology of the syndrome designated pellagra sine pellagra, a series of observations was made in order to determine whether it is due to a deficiency in nicotinic acid or some other vitamin.

A brief preliminary note on part of the observations has already been published (*12*).

OBSERVATIONS

A group of 18 adult white women in an institution were given a careful physical examination and found to be in good general condition except for mental disorders and physical defects of a nature which would not interfere with the observations. There were no interfering skin, lip, or buccal lesions.

The diet was then changed from the general, varied institution menu to the ration given in tables 1 and 2, which is a modification of that used by Goldberger and Tanner (*9*). The diet was prepared in a special diet kitchen under the direct, careful, and constant supervision of a trained dietitian,[4] who weighed each item in the diet. The entire group ate simultaneously at one table under the supervision of attendants and nurses. Any food left on the plates at the end of the meal was weighed and an approximation of the actual food intake at each meal was obtained.

TABLE 1.—*Casein diet* [1]

BREAKFAST AND SUPPER [2]

		Ounces	Grams	Protein	Fat	Carbohydrate
				Gm.	*Gm.*	*Gm.*
Mixture	Cornmeal	2.5	71.0	6.0	3.3	52.5
	Cowpeas	.16	4.54	1.0	.06	2.7
	Lard	.25	7.0	0	7.0	0
	Casein [3]	.81	23.0	19.7	.07	0
	Salt and pepper					
Brown gravy	Flour	.25	7.0	.8	.07	5.0
	Lard	.25	7.0	0	7.0	0
	Salt and pepper					
Cane sirup		1.5	42.35	0	0	30.0
Loaf bread		1.8	51.0	4.1	2.4	26.5
Coffee, little sugar						
Total		7.51	212.89	31.6	19.9	116.7
Calories (total 772) [2]				126.0	179.0	467.0

[1] Calculated from the Chemical Composition of American Food Materials. By W. O. Atwater and A. P. Bryant. U. S. Dept. of Agr. Bull. No. 28.
[2] In addition, 0.25 oz. (7 grams) of sirup, equaling 20 calories, was given for supper.
[3] Analysis of the casein yielded moisture 9.14 percent, nitrogen 13.69 percent, and ether extract 0.3 percent.

[4] We are very grateful to Mrs. Marie S. Echols, dietitian, U. S. Public Health Service, for her able assistance in carrying out this phase of the work.

TABLE 2.—*Casein diet* [1]

DINNER

		Ounces	Grams	Protein	Fat	Carbohydrate
				Gm.	*Gm.*	*Gm.*
Mixture	Cornmeal	2.5	71.0	6.0	3.3	52.5
	Cowpeas	.16	4.54	1.0	.06	2.7
	Lard	.25	7.0	0	7.0	0
	Casein	.81	23.0	19.7	.07	0
	Salt and pepper					
Brown gravy	Flour	.25	7.0	.8	.07	5.0
	Lard	.25	7.0	0	7.0	0
	Salt and pepper					
Cane sirup		1.5	42 35	0	0	30.0
Cornbread	Cornmeal	2.0	57.0	4.8	2.7	42.2
	Lard	.125	3.6	0	3.6	0
Cod liver oil		5	14.0	0	14.0	0
Tomato juice [2]		4.0	112.0	.98	.08	4.0
Total				33.28	37 88	136.4
Calories (total 1,020)				134.0	340.0	546.0

[1] Calculated from the Chemical Composition of American Food Materials. By W. O. Atwater and A. P. Bryant. U. S. Dept of Agr Bull No. 28.
[2] Analysis of the tomato juice yielded moisture 94 33 percent, ash 0 95 percent, nitrogen 0.14 percent, and ether extract 0.07 percent

The ration was prepared as follows: White cornmeal, coarsely ground cowpeas, leached casein,[3] and calcium carbonate were weighed into the inner portion of a large double boiler with a little salt and sufficient water to cook satisfactorily. Nineteen portions were cooked in order to be able to remove 18 without loss. After cooking 1½ hours enough water was added to bring the mixture to the proper consistency. After deducting the weight of the container, the remainder was divided by 19, and 18 portions served. The one portion remaining in the container served as a check against errors in serving.

The gravy which was served on the cereal legume mixture was prepared by browning white flour, adding lard, and bringing to a convenient volume with water. Nineteen servings were prepared and 18 served.

The cornbread was prepared by mixing white cornmeal and lard with salt and water, and baking. After baking, the total weight was divided by 19, and 18 portions served.

The loaf bread was prepared in the institution bakery from 100 pounds of white flour, 6 pounds of lard, 5 pounds of sugar, and water. This yielded 152 loaves of 1 pound each. The freshly made bread was delivered to the diet kitchen each day and was sliced and weighed by the dietitian before each meal.

The sirup was a commercial cane sirup served by volume as drawn from the barrel.

The tomato juice was a commercially canned variety to which isrup of iodide of iron was added. This was served by volume, and

[3] Commercial casein leached for a week in daily changes of acidulated water. (After McCollum, Simmonds, Shipley, and Park: Bull. Johns Hopkins Hosp., 33: 296 (1922).)

the cod liver oil (U. S. P. XI) measured by volume individually into the same cup. Once each week beginning on the 13th week of the experiment 3.3 mg. of crystalline thiamin chloride and 30 mg. of crystalline ascorbic acid in solution were also added to each serving of tomato juice.

The coffee given at breakfast and supper contained a small amount of sugar, but no milk. The total daily food allowance is given in table 3. If the entire ration was consumed, a total of approximately 2,584 calories was taken daily, which was derived from 96.5 gm. of protein, 77.6 gm. of fat, and 374.8 gm. of carbohydrate. Thus, the protein supply is ample and of good quality, the carbohydrate-fat ratio is adequate, and the energy intake is sufficient for adult, non-working women.

TABLE 3.—*Daily food allowance*

Meal	Calories	Protein	Fat	Carbohydrate
		Gm.	*Gm.*	*Gm.*
Breakfast	772	31.6	19.9	116.7
Dinner	1,020	33.3	37.8	136.4
Supper	792	31.6	19.9	121.7
Total	2,584	96.5	77.6	374.8

The mineral and vitamin analysis of the ration is given in table 4. It is seen that the ration supplied 15 mg. of iron, 1.5 gm. of calcium, 1.2 gm. of phosphorus, 7.4 mg. of iodine, 9,324 International Units of vitamin A, 435 I. U. of B_1, 14.3 mg. of ascorbic acid (vitamin C), and 1,190 I. U. of vitamin D. The ration is somewhat low in nicotinic acid and contains very little riboflavin.

TABLE 4.—*Mineral and vitamin content of diet*

Food	Quantity	Iron	Calcium	Phosphorus	Iodine	Vitamins			
						A	B_1	C	D
	Gm.	*Gm.*	*Gm.*	*Gm.*	*Gm.*	*I. U.*	*I. U.*	*Mg.*	*I. U.*
Cornmeal	270.0	0.0024	0.048	0.513			175		
Cowpeas	13.5	.0010	.013	.061			23		
Casein	69.0			.593					
Lard	47.5								
Flour	56.5	.0005	.011	.051			21		
Cane sirup	133.0	.0097	.280	.058			39		
Calcium carbonate	3.0		1.200						
Tomato juice	112.0		.006	.016		924	37	10	
Cod liver oil	14.0					8,400			1,190
Iodide of iron	0.1	.0016			0.0074				
Thiamin chloride [1]							140		
Ascorbic acid [1]								4.3	
Total		.0152	1.558	1.292	.0074	9,324	435	14.3	1,190

[1] Calculated as one-seventh of weekly dose.

On this ration 10 of the 18 women developed symptoms similar to those previously described as pellagra sine pellagra between the 94th and 130th days. There was maceration in each angle of the mouth, the lips were reddened along the line of closure, and the mucosa appeared thin, shiny, and denuded. We have called this lesion a cheilosis (morbid condition of the lips). The fissures in the angles of the mouth resemble the lesions described as perlèche. Smears taken from 2 cases showed what appeared to be gram-positive diplococci. On culture the organism was found to be a streptococcus. No Monilia were seen. In addition to the lip lesions there was also a scaly, greasy desquamation in the nasolabial folds, on the alae nasi, in the vestibule of the nose, and, in a few instances, on the ears and eyelids.

One of these 10 women had developed mild skin lesions of pellagra, beginning on the 36th day and progressing until a definite diagnosis was made on the 76th day. At this time treatment was started with a daily dose of 30 mg. of nicotinic acid. The skin lesions completely disappeared in 30 days. In spite of the continued administration of this amount of nicotinic acid daily, the cheilosis appeared 21 days after the skin lesions had completely healed and 127 days from the beginning of the experiment. On the 130th day the nicotinic acid was increased to 100 mg. daily. Forty-five days later the lesions were still present and increasing in severity. Treatment was then started with 0.025 mg. of riboflavin per kilogram of body weight daily, and the lesions completely disappeared in 6 days.

Five of the 10 women with the cheilosis were treated with a daily dose of 100 mg. of nicotinic acid for from 5 to 43 days without benefit. Four were given 1 mg. of synthetic riboflavin for 3 days and then all 5 were given 0.025 mg. per kilogram of body weight daily. The symptoms entirely disappeared in 4 in 10, 12, 13, and 24 days. The fifth woman, who was very obese and whose weight fluctuated around 210 to 215 pounds, showed slow improvement, and after 49 days the daily dose of riboflavin was increased to 0.05 mg. per kilogram of body weight. The lesions then improved more rapidly but failed to heal completely, and after 36 days the daily dose was increased to 0.075 mg. of riboflavin per kilogram of body weight. After 20 days the lesions had completely disappeared.

The remaining 4 women with the cheilosis did not receive any nicotinic acid. Treatment was started with daily doses of 1 mg. or 2 mg. of synthetic riboflavin for from 3 to 10 days, after which the daily dose was changed in all cases to 0.025 mg. per kilogram of body weight. The symptoms completely disappeared after 5, 6, 20, and 47 days of treatment.

In all 10 of the women with the cheilosis, treatment with riboflavin was discontinued as soon as the lesions had entirely disappeared. In all 10 the cheilosis recurred between the 177th and 293d days.

Treatment was again started with a daily dose of 0.025 mg. of synthetic riboflavin per kilogram of body weight and all symptoms disappeared in from 4 to 20 days. The results are summarized in table 5.

TABLE 5.—*Summary of results of treatment*

Patient number	Days to first symptom	Nicotinic acid			Day began riboflavin	Day symptoms disappeared	Day discontinued riboflavin	Day symptoms recurred	Day resumed riboflavin	Day symptoms disappeared
		Day started	Daily dose	Day discontinued						
1	131	----------	----------	----------	136	183	183	293	332	352
2	128	131	100	160	136	241	244	265	272	284
3	114	131	100	160	136	149	148	204	221	226
5	95	----------	----------	----------	129	135	140	177	202	216
8	128	77 131 190	30 100 30	177	177	183	183	260	265	280
9	128	131	100	160	136	160	160	179	193	206
10	100	----------	----------	----------	129	150	150	236	250	254
11	130	131	100	177	176	184	185	249	265	283
14	130	131	100	160	136	148	150	193	221	226
16	107	----------	----------	----------	129	133	140	186	197	209

In the patient who required the large dosage of riboflavin in the first attack, symptoms cleared up with the 0.025 mg. per kilogram of body weight per day, but in spite of continuing this dosage, maceration occurred in each angle of the mouth beginning on the 293d day and progressed until a small, transverse fissure was seen at the left angle of the mouth on the 330th day. The dosage was increased to 0.05 mg. per kilogram at that time and, although improvement occurred, the lesions still had not entirely healed by the 362d day. The daily dose was then increased to 0.1 mg. per kilogram of body weight. On the 364th day the fissure at the angle of the mouth was healing and there was slight denudation of the lower lip. The observations were then discontinued.

The 8 of the 18 women who had not developed the cheilosis by the 139th day were separated into 2 groups of 4 each. One group began a daily preventive dose of 0.025 mg. of synthetic riboflavin per kilogram of body weight. No symptoms were observed in this group during the observation period of 365 days except for mild skin lesions of pellagra in 1, beginning on the 362d day. The other group of 4 continued the ration without the addition of riboflavin. Two of this group developed the cheilosis on the 191st and 293d day, and a third showed slight maceration in the angle of the mouth, with a lesion in the vestibule of the nose, on the 200th day. All 3 were given a daily dose of 0.025 mg. of synthetic riboflavin per kilogram of body weight. The lesions then disappeared after 8, 9, and 25 days. One of these on self-restricted food intake also developed hyperesthesia of the feet, and a daily dose of 6.6 mg. of thiamin was started on the 275th day.

The fourth woman did not show lesions of any kind during the 365 days of observation on the diet. The results are summarized in table 6.

TABLE 6.—*Preventive test*

Patient No.	Days to first symptom	Day began riboflavin	Day symptoms disappeared	Day discontinued riboflavin
4		139		
6		139		
7		139		
15		139		
12	293	307	316	317
13	200	221	229	229
17				
18	191	265	290	

A careful record of the daily food consumption was kept by weighing back the food left on each plate at each meal. These data are only an

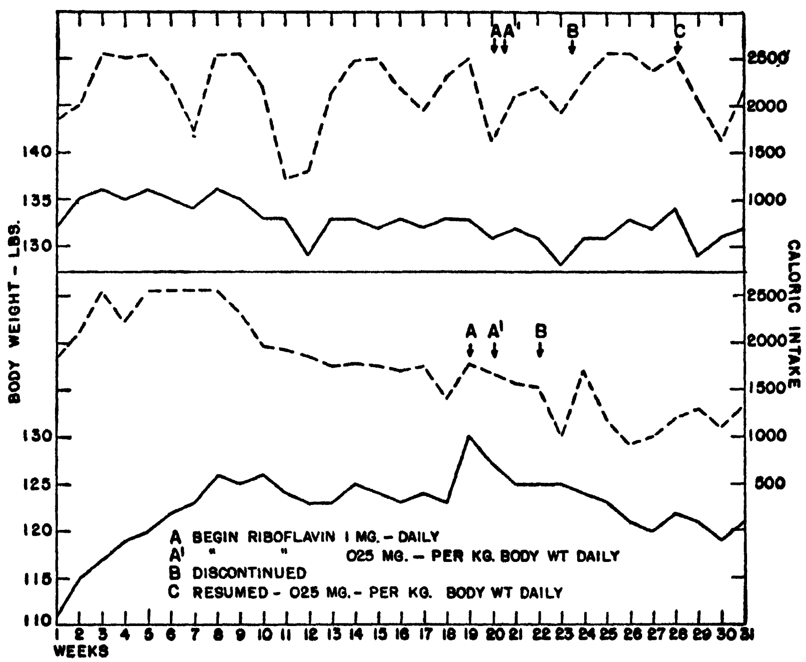

FIGURE 1.

approximation, owing to such factors as unavoidable waste and mixture of various items of the diet on the plate. The data are, therefore, averaged by the day for each week. The patients were weighed once weekly and the body weight correlated with the calculated food intake. Owing to lack of space only sample records of these data from two patients are shown in figure 1. It is seen that there is no consistent

increase in appetite or significant change in body weight during treatment with riboflavin.

Hemoglobin determinations, red blood cell and white blood cell counts were done at regular intervals. These data are presented in table 7. There does not appear to be any significant change during the period of observation.

DISCUSSION

These observations indicate that the lesions on the lips, the fissures in the angles of the mouth, and the seborrheic accumulations around the nose are manifestations of a deficiency in riboflavin.

Since the publication of our preliminary note on part of these observations, Vilter, Vilter and Spies (*13*) have reported increased vigor, improvement in sense of well-being, and improvement in the cutaneous lesions in 4 cases of pellagra following the administration of 50 mg. of riboflavin daily. Oden, Oden, and Sebrell (*14*) have found naturally occurring cases of riboflavin deficiency, without the skin lesions of pellagra, in Georgia.

It is to be noted that one of the women failed to respond to the daily dose of 0.025 mg. of riboflavin and that it was necessary to increase this dose to 0.075 mg. daily before rapid healing occurred. This observation, together with the fact that the lesions disappeared rather slowly in some of the other women, leads us to believe that this dosage is rather low and that considerably larger amounts should be used in the clinical treatment of the condition. Oden, Oden, and Sebrell (*14*) used 5 mg. daily with success in 3 cases, and Spies, Bean, and Ashe (*15*) have found from 5 to 50 mg. per day to be effective.

In addition to the lesions of riboflavin deficiency, other observers (*15*, *16*) have pointed out that the peripheral neuritis of beriberi occurs in some cases of pellagra. It, therefore, appears that we should revise our concept of clinical pellagra in that the condition may be a mixture of symptoms from three different deficiencies, namely, nicotinic acid, riboflavin, and thiamin chloride, and that any one may occur alone or in combination with any other. Therefore, in order to avoid further confusion, it is suggested that the diagnosis of pellagra should be confined to that syndrome which responds to nicotinic acid, namely, skin lesions, gastro-intestinal lesions, stomatitis, and mental disturbances, while the peripheral neuritis which responds to thiamin chloride should be diagnosed as beriberi, and the lesions described in this paper, which respond to riboflavin, require a new designation since their true nature has not been hitherto recognized. We have suggested the word "ariboflavinosis" for this purpose. Where the clinical condition is characterized by the simultaneous presence of more than one of these syndromes, a diagnosis of a multiple deficiency is indicated.

TABLE 7.—*Blood examinations*

Day of experiment

Patient No.	0–2 Hb	0–2 RBC	0–2 WBC	23–25 Hb	23–25 RBC	23–25 WBC	65–67 Hb	65–67 RBC	65–67 WBC	106–108 Hb	106–108 RBC	106–108 WBC	147–149 Hb	147–149 RBC	147–149 WBC
1	13.0	3.8	6.5	12.4	4.18	7.4	12.5	4.43	7.0	13.3	4.15	7.4	11.9	3.96	7.6
2	13.4	4.0	9.1	13.1	3.86	8.3	14.2	3.88	8.0	12.5	3.75	6.9	13.3	4.0	10.0
3	12.4	3.9	6.2	11.9	4.29	6.3	12.1	4.32	13.0	10.9	4.23	5.2	12.5	4.4	7.2
4	12.1	4.5	7.0	12.8	3.9	7.0	12.5	3.99	5.5	12.5	4.0	6.5	12.5	4.0	8.3
5	12.2	4.6	7.0	11.8	4.25	7.2	12.4	4.15	5.6	11.5	3.89	4.5	12.5	4.17	7.2
6	12.2	3.8	9.0	12.0	4.11	9.7	13.6	4.06	9.5	11.0	3.72	7.1	12.5	3.75	8.6
7	11.2	4.5	9.2	10.2	3.83	7.4	11.3	4.01	8.7	11.6	3.93	6.8	11.4	3.86	7.0
8	10.4	3.3	6.2	10.0	3.32	5.9	10.9	3.24	6.8	10.4	3.92	6.8	11.3	3.83	6.3
9	12.0	4.3	9.3	11.4	3.83	5.0	12.1	4.07	5.2	12.7	4.16	4.6	13.0	4.0	6.3
10	12.0	4.0	12.5	11.4	3.86	10.2	13.5	4.01	8.2	13.0	4.44	9.3	13.4	4.2	10.2
11	12.5	4.7	9.7	12.5	4.62	7.0	14.5	3.59	10.5	12.2	4.28	6.2	12.3	3.8	8.4
12	9.0	4.5	7.2	11.0	3.64	7.1	11.8	3.93	20.0	11.0	3.96	8.3	12.6	3.5	6.4
13	11.8	4.6	5.0	11.4	3.84	5.3	12.5	3.13	4.0	12.0	4.44	3.0	13.0	3.91	5.0
14	14.5	3.7	6.6	11.0	3.39	7.8	14.6	3.85	5.8	14.0	4.39	5.9	13.0	3.82	6.9
15	11.4	3.9	10.4	11.5	4.15	9.0	14.6	4.05	10.2	13.1	4.24	10.5	13.1	3.81	12.0
16	10.0	3.6	5.4	12.5	3.66	8.4	11.9	3.93	6.0	10.1	3.49	7.3	10.0	3.3	7.2
17	11.9	3.7	6.5	12.0	4.14	4.6	11.6	3.6	4.0	12.5	3.54	4.1	12.8	3.56	6.3
18	12.0	4.3	9.4	11.9	4.0	4.2	9.4	3.86	4.1	10.0	4.33	4.3	10.3	3.94	6.5

Patient No.	189–191 Hb	189–191 RBC	189–191 WBC	217–219 Hb	217–219 RBC	217–219 WBC	259–261 Hb	259–261 RBC	259–261 WBC	291–293 Hb	291–293 RBC	291–293 WBC	333–335 Hb	333–335 RBC	333–335 WBC
1	12.0	4.3	5.0	11.8	4.0	7.5	13.0	4.3	5.0	12.5	3.71	4.8	11.7	3.76	4.3
2	12.8	3.3	9.7	13.3	4.05	7.5	13.0	3.9	9.1	12.2	3.3	9.0	12.7	3.6	10.8
3	11.4	3.88	6.9	12.0	3.46	6.5	13.0	3.8	5.5	12.3	3.89	6.0	11.0	3.22	5.6
4	13.0	3.49	9.1	12.0	3.96	6.0	13.0	3.82	7.0	11.9	3.6	7.7	11.6	3.74	6.0
5	11.5	3.96	6.2	12.0	4.0	6.2	12.0	3.6	5.3	10.8	3.6	4.3	10.0	3.68	4.3
6	11.8	3.7	7.0	12.0	3.5	7.4	12.0	3.7	8.4	12.0	3.9	7.2	11.4	3.9	5.0
7	10.1	3.7	10.0	10.5	3.6	7.5	11.4	3.7	8.4	10.4	3.79	7.8	10.0	3.5	9.0
8	10.5	3.4	4.0	11.0	3.5	7.2	11.6	3.81	6.1	9.8	3.13	7.6	8.8	3.0	7.8
9	11.5	3.55	5.6	13.0	4.04	7.0	13.7	4.27	14.7	12.0	3.7	5.5	11.9	3.63	4.0
10	12.6	3.4	6.5	13.5	3.7	10.0	13.9	4.12	10.8	13.1	3.7	11.0	11.9	3.38	9.3
11	11.5	3.5	6.0	12.0	4.0	5.0	12.0	3.6	5.0	11.0	3.65	6.3	11.4	3.95	6.5
12	11.8	3.9	8.0	11.6	3.91	7.1	10.5	3.5	5.9	11.0	3.7	7.3	11.6	3.46	6.7
13	13.0	3.8	6.0	13.7	4.07	5.5	12.5	3.6	4.0	12.7	3.84	4.2	11.7	3.7	4.0
14	13.5	4.07	5.0	13.4	4.0	6.0	14.0	4.28	4.3	13.5	3.9	5.8	11.5	3.37	5.7
15	12.2	3.9	6.3	12.2	3.92	9.0	13.3	3.79	11.5	12.0	3.4	10.0	12.9	3.78	9.0
16	9.0	3.2	5.0	9.5	3.16	7.7	11.0	3.45	6.9	9.0	2.91	6.3	9.0	3.09	8.2
17	13.5	4.01	8.0	13.0	3.77	7.0	13.0	3.56	5.0	12.0	3.5	5.2	11.0	3.31	3.5
18	10.0	3.76	7.0	11.0	3.86	6.3	11.3	3.91	7.2	11.8	3.86	7.8	9.5	3.46	5.5

The above considerations make it important to emphasize especially the role of an adequate diet, and the use of foods naturally rich in nicotinic acid, thiamin, and riboflavin, in the treatment of these conditions.

The crystalline vitamin preparations are very valuable therapeutic agents and should be used after a correct diagnosis has been made, but their limitations in the presence of multiple deficiencies must also be recognized, and an adequate diet is also one of the essentials for the proper treatment of deficiency diseases. Fortunately, yeast and liver and most natural foodstuffs that are rich in one of these vitamins also contain the others to some extent. It is only when the treatment of a deficiency disease, such as pellagra, beriberi, or ariboflavinosis is undertaken with a crystalline vitamin preparation alone, without giving due attention to the diet, that the possibility of the simultaneous presence of symptoms from a deficiency in one of the other vitamins becomes of serious importance and the use of other vitamin preparations may be necessary to secure relief from all symptoms.

SUMMARY

Thirteen out of 18 women receiving a special diet low in riboflavin content developed a reddened, denuded lesion of the lips, maceration and fissuring in the angles of the mouth, and seborrheic accumulations at the nasolabial folds. These lesions disappeared following the daily administration of synthetic riboflavin; they reappeared following the discontinuance of the riboflavin, and again disappeared following riboflavin therapy. Six of these women were treated for varying lengths of time with nicotinic acid without benefit.

Four of the remaining 5 women began a daily preventive dose of synthetic riboflavin on the 139th day and showed no lesions of any kind during the 365 days of observation.

One woman did not receive any riboflavin therapy and showed no lesions at any time during the 365 days of observation.

CONCLUSIONS

Lesions on the lips and seborrheic accumulations on the face similar in appearance to the condition formerly described as pellagra sine pellagra occurred in women on a diet low in riboflavin and were alleviated and prevented by the administration of synthetic riboflavin, but were not benefited by nicotinic acid. The conclusion therefore seems warranted that these lesions are a manifestation of riboflavin deficiency.

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HUMAN SERUM AS A STABILIZER OF SCARLET FEVER STREPTOCOCCUS TOXIN DILUTED FOR THE DICK TEST [1]

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The Dick test when made with test toxin of the required potency is a reasonably reliable method for determining susceptibility to scarlet fever. Using a reaction of 10 × 10 mm. or greater as an indication of susceptibility, the author has observed an attack rate of 0.7 per 1,000 in grammar school children who reacted negatively to the test as compared with a rate of 6.8 in their untested classmates (it is estimated that this untested control group is 44.7 percent Dick positive). The tests in this study were made with freshly diluted test toxin, a portion of each lot being returned from the field for check testing. However, such rigid requirements cannot be laid down for the test toxin offered the medical profession by the biological laboratories where a dating period must be allowed. At the present time a dating period of not more than 6 months is permitted the diluted toxin. Obviously such toxin should show no significant deterioration within

[1] From the Division of Infectious Diseases, National Institute of Health.

that period, if kept under the conditions recommended on the label; deterioration, nevertheless, sometimes occurs. In view of this fact, some thought has been given to the possibility of finding a diluent which will insure greater stability to the test toxin.

As the result of some other work with the use of colloidal substances in scarlet fever toxin, a study has been made of the stabilizing effect of human serum on toxin diluted for the Dick test.[3] Human serum was selected because its presence would not introduce a foreign protein into the test solution.

EXPERIMENTAL METHODS

Preparation of the diluent.—The Scarlet Fever Committee recommends to its licensed laboratories the use of a 10 percent phosphate buffer of pH 7.0 in normal saline, to which 0.4 percent of phenol is added. Such a buffered diluent at different pH levels has been used in the present study, either alone or with varying amounts of sterile, human serum. Later the amount of serum used was fixed at a 1:500 dilution.

Types of glass containers.—These included pyrex glass bottles with and without glass stoppers, three types of flame-sealed glass ampules, and eight types of rubber stoppered ampules, of which six were clear glass and two amber. The object was to try various qualities of both glass and stopper.

pH concentration of the diluent.—A pH level of 7.0 heretofore had been considered essential for stability of the test toxin. In the present study it was thought advisable to include a wider range. Altogether five levels were studied, beginning with 6.6 and increasing at 0.2 intervals.

Temperature.—Observations were made at 37° C., room temperature, the varying temperatures encountered during transit by ordinary mail, and at 5° C.

EXPERIMENTAL RESULTS

It is to be expected that the presence of a 1:500 concentration of human serum in the diluted test toxin would not significantly alter the character of the human skin reaction to the toxin. Nevertheless, tests were made on a group of student nurses with freshly diluted toxin, with and without serum. The individual reactions are shown in table 1, from which it must be concluded that the serum has no significant influence on the size of the reaction. In some instances it seemed that the reaction from the serum-containing toxin was slightly more intense and possessed a more clearly defined border.

A series of toxin dilutions was next set up at pH 7.0 in glass stoppered pyrex bottles of liter size with varying amounts of human serum.

[3] Since this work was begun, Glenny and Stevens (Brit. Med. J., 1:709 (1937)) have reported on a similar study of diphtheria toxin for the Schick test.

These were stored at room temperature in a dim light. The toxin dilution in plain buffer soon began to show some deterioration (table 2), whereas the test toxins containing serum showed no loss of potency over a period of 651 days. Because of the comparable results obtained in human tests (table 1) with and without 1:500 serum and the stability shown in table 2 with this amount, it was accepted for use in the succeeding experiments.

TABLE 1.—*Protocol showing the Dick test reactions on human test subjects when tested simultaneously on the forearms with National Institute of Health standard control toxin freshly diluted with and without human serum*

Subject [1]	Standard control toxin diluted in plain or buffered saline [2]	Standard control toxin diluted in buffered saline + 1:500 human serum [2]	Subject [1]	Standard control toxin diluted in plain or buffered saline [2]	Standard control toxin diluted in buffered saline + 1:500 human serum [2]
EGB	22×27 P	23×27 P.	FMP	20×25 FP	19×23 P.
MJB	18×18 FP	18×18 FP.	VKR	20×32 P	19×27 P.
WMD	15×28 FP	16×21 FP.	SKR	16×26 FP	19×23 P.
CWH	16×19 FP	14×14 FP.	DMR	16×21 VFP	17×21 FP.
LEM	13×18 VFP	13×18 VFP.	LSS	17×22 FP	16×18 FP.
MEM	15×18 VFP	13×18 VFP.	MV	20×26 FP	20×28 FP.
RLM	12×15 VFP	13×15 VFP.	MRW	15×17 VFP	15×17 VFP.
LIKM	15×26 VFP	20×25 FP.	RAW	15×16 FP	15×16 FP.
NMM	21×23 P	21×23 P.	E	19×26 FP	20×23 FP.

[1] 28 other subjects were negative to both toxins.
[2] The letters following the measurements indicate the intensity of the reaction as very faint pink, faint pink, or pink.

TABLE 2.—*Stability of Dick test toxin diluted in buffered saline of pH 7.0, with and without human serum, contained in one-liter glass stoppered pyrex bottles, and stored at room temperature and in light*

Date of testing	No serum		1 STD of control toxin	Serum 1:500, trial toxin	1 STD of control toxin	Serum 1:1,000, trial toxin	1 STD of control toxin	Serum 1:2,500, trial toxin
	1 STD of control toxin	Trial toxin						
Apr. 27, 1937 [1]								
June 1, 1937	19×25+ [2]	15×15±	18×22+	16×26+	14×20+	15×18+	11×11+	14×14+
July 7, 1937	16×26+	14×24+	14×16+	15×19+	13×14+	16×16+	16×17+	20×20+
Aug. 10, 1937	16×25+	16×25+	15×18+	15×16+	16×17+	20×20+	13×20+	17×20+
Sept. 9, 1937	15×24+	15×20±	16×17+	15×20+	15×25+	14×24+	16×23+	17×25+
Dec. 29, 1937	15×20+	10×15±	16×18+	18×20+	18×18+	18×20+	16×18+	16×20+
Apr. 27, 1938	16×16+	Lost	14×20+	16×20+	18×20+	20×20+		
Feb. 13, 1939 [3]	15×25+	15×15+	14×18+	16×20+	15×20+	14×20+	17×19+	20×20+

[1] Dilutions prepared on this date.
[2] The symbols following the reaction measurements indicate the intensity of the reactions both in color and swelling. The symbols grade upward as ±, +, ++, and +++.
[3] Total elapsed time is 651 days.

The influence of varying the pH level is shown in table 3. In this experiment batches of toxin were buffered at pH 6.6, 6.8, 7.0, 7.2, and 7.4, respectively, with and without serum. The results at 6.6 are not shown in the table since they are the same as for the other levels. The respective dilutions were placed in 100-cc. cork stoppered pyrex bottles, stored at 37° C. for 7 months and then at 5° C. for the remainder of the 561 days of the experiment. The dilutions containing

no serum, irrespective of the pH level, showed a progressive deterioration of the skin reacting factor. At the same time no dilution containing 1:500 serum showed significant deterioration. A freshly diluted standard control was not used in this experiment until after a lapse of 591 days, when each serum-containing dilution was tested against the control with the following results:

	6.8	*7.0*	*7.2*	*7.4*
Reaction to the freshly diluted control toxin	16×20+	10×12+	15×20+	16×17+
Reaction to the serum-containing test toxin	15×20+	14×16+	16×19+	17×17+

TABLE 3.—*Stability of Dick test toxin diluted in buffered saline of different pH levels, with and without human serum, contained in cork stoppered pyrex bottles of 100 cc. capacity, stored at 37° C. for 7 months, and then at 5° C. for an additional period*

Date of testing	pH 6.8		pH 7.0		pH 7.2		pH 7.4	
	Serum 1:500	No serum	Serum 1:500	No serum	Serum 1:500	No serum	Serum 1:500	No serum
July 27, 1937 [1]	----------	----------	----------	----------	----------	----------	----------	----------
Aug. 4, 1937	20×20++	16×19+	17×21++	15×19+	16 30++	15×25+	20×30++	18×30+
Aug. 10, 1937	18×20+	14×20±	20×21+	15×15±	14×25+	15×25±	18×20+	16×20±
Aug. 17, 1937	18×21+	15×16±	19×22+	10×12±	19×26+	14×20±	19×30+	15×18±
Aug. 25, 1937	19×24+	15×15±	17×22+	15×16±	17×30+	15×20+	19×26+	13×16±
Sept. 1, 1937	20×30++	20×20+	22×25+	18×20+	21×40++	17×30+	20×30++	15×20+
Sept. 9, 1937	20×24+	12×15±	21×21+	10×10±	17×30+	15×25±	16×25+	11×15±
Sept. 23, 1937	22×25++	16×20±	22×24++	14×15±	16×30++	13×25+	21×30++	15×20+
Nov. 1, 1937	18×20+	5 ×7±	15×15+	8 ×10±	15×21+	11×15±	----------	----------
Nov. 26, 1937	22×28++	20×25+	20×22++	13×15+	19×25++	13×18+	19×24++	13×18+
Dec. 29, 1937	18×20++	12×18+	19×20++	14×15+	18×34++	14×15+	18×24++	15×16+
Apr. 27, 1938	22×25+	15×18±	15×24++	14×17±	20×20+	16×18±	16×30+	14×20±
Feb. 13, 1939 [2]	16×30+	Neg.	18×21+	Neg.	20×20+	Neg.	17×26+	6 ×8+

[1] Dilutions prepared on this date.
[2] Total elapsed time of the experiment is 561 days. A fifth dilution at pH 6.6 showed similar reactions.

Consideration was next given to the type of glass and the stopper used in the dispensing vials. As previously stated, the object was to include ampules of varying qualities of glass and stoppers. All of the filled ampules were placed in an inverted position so that the toxin solution would come in contact with the stopper and were stored at 37° C. for 181 days, and then at 5° C. for 332 days. Ampules were prepared for the full pH range, but because of the large number, sufficient test animals were not available to include all variations shown in table 4. Random sampling of ampules both as to type and pH level invariably gave similar results and it was therefore decided to report in detail only on the 7.0 and 7.4 pH level. These levels were selected because the former has heretofore been considered the most favorable to the diluted toxin, and the latter, the most detrimental. In this experiment again the data indicate that diluted toxin containing 1:500 human serum showed no deterioration in the skin-reacting factor, irrespective of the type of glass or stopper or the pH level. This is in contrast to the marked deterioration shown in the corresponding dilutions without serum.

TABLE 4.—*Stability of Dick test toxin when diluted in buffered saline at different pH levels, with and without human serum, contained in various types of ampules, stored at 37° C. for 180 days and then at 5° C. for an additional period*

Ampules of the following types were filled with test toxin, with and without 1:500 human serum on Sept. 20, 1937	Elapsed time 67 days			Elapsed time 122 days		
	Control toxin	Serum 1:500	No serum	Control toxin	Serum 1:500	No serum
Buffered at pH 7.0						
1 cc. nonsol. glass, flame sealed	--------	--------	--------	--------	--------	
1 cc. nonsol. glass, red rubber stopper	--------	--------	--------	--------	--------	
5 cc. nonsol. glass, pure gum stopper	--------	18×18++	15×15+	17×19+	18×23+	Neg.
5 cc. nonsol. glass, red rubber stopper	--------	19×20+	13×13±	16×16+	16×18+	10×15±
1 cc. typhoid vaccine vial, red rubber stopper.	--------	--------	--------	16×28+	15×26+	10×11±
1 cc. nonsol. glass, flame sealed	--------	--------	--------	--------	--------	
1 cc. poor quality glass, flame sealed [1]	--------	--------	--------	--------	--------	
2 cc. poor quality amber, red rubber stopper.	--------	--------	--------	16×20+	15×20+	4×6+
10 cc. N. I. H. serum vial	--------	19×21++	19×20+	15×20+	17×30+	10×15±
5 cc. amber glass, black rubber stopper	--------	17×17+	8×7±	14×18+	18×20+	11×15±
2 cc. rabies vaccine vial, red rubber stopper.	--------	--------	--------	15×20+	15×23+	9×13±
Buffered at pH 7.4						
1 cc. nonsol. glass, flame sealed	--------	--------	--------	--------	--------	
1 cc. nonsol glass, red rubber stopper	--------	--------	--------	--------	--------	
5 cc nonsol glass, pure gum stopper	--------	20×29++	14×20+	--------	--------	
5 cc nonsol. glass, red rubber stopper	--------	15×21+	12×13±	--------	--------	
1 cc. typhoid vaccine vial, red rubber stopper	--------	--------	--------	--------	--------	
1 cc. nonsol glass, flame sealed	--------	--------	--------	--------	--------	
1 cc. poor quality glass, flame sealed [1]	--------	--------	--------	--------	--------	
2 cc. poor quality amber, red rubber stopper	--------	--------	--------	--------	--------	
10 cc. N. I. H. serum vial, red rubber stopper.	--------	20×35++	18×25+	--------	--------	
5 cc. amber glass, black rubber stopper	--------	17×19+	5×6±	--------	--------	
2 cc. rabies vaccine vial, red rubber stopper.	--------	--------	--------	--------	--------	

Ampules of the following types were filled with test toxin, with and without 1:500 human serum on Sept. 20, 1937	Elapsed time 152 days			Elapsed time 391 days		
	Control toxin	Serum 1:500	No serum	Control toxin	Serum 1:500	No serum
Buffered at pH 7.0						
1 cc. nonsol. glass, flame sealed	--------	--------	--------	14×16+	15×18+	4×6+
1 cc. nonsol. glass, red rubber stopper	--------	--------	--------	14×20+	14×18+	Neg.
5 cc. nonsol. glass, pure gum stopper	15×18+	17×19+	10×15±	15×18+	15×18+	5×7±
5 cc. nonsol. glass, red rubber stopper	15×22+	17×20+	13×15+	15×17+	14×15+	3×4+
1 cc. typhoid vaccine vial, red rubber stopper.	15×21+	20×20+	Neg.	15×16+	15×19+	2×4+
1 cc. nonsol. glass, flame sealed	--------	--------	--------	15×20+	16×20+	13×14+
1 cc poor quality glass, flame sealed [1]	--------	--------	--------	--------	--------	
2 cc. poor quality amber, red rubber stopper.	18×20+	16×19+	13×18±	15×16+	13×16+	Neg.
10 cc. N. I. H. serum vial	18×23+	20×23+	14×15+	15×17+	13×15+	Neg.
5 cc. amber glass, black rubber stopper	15×18+	15×15+	10×12±	15×18+	14×16+	Neg.
2 cc. rabies vaccine vial, red rubber stopper.	17×24+	16×18+	13×14±	14×15+	14×15+	Neg.
Buffered at pH 7.4						
1 cc. nonsol. glass, flame sealed	--------	--------	--------	14×18+	16×23+	Neg.
1 cc. nonsol. glass, red rubber stopper	--------	--------	--------	15×17+	15×16+	Neg.
5 cc. nonsol. glass, pure gum stopper	--------	--------	--------	15×20+	17×19+	10×11±
5 cc. nonsol. glass, red rubber stopper	--------	--------	--------	16×21+	18×24+	Neg.
1 cc. typhoid vaccine vial, red rubber stopper.	--------	--------	--------	16×21+	17×18+	7×11±
1 cc. nonsol. glass, flame sealed	--------	--------	--------	16×20+	16×18+	16×16±
1 cc. poor quality glass, flame sealed [1]	--------	--------	--------	--------	--------	
2 cc. poor quality amber, red rubber stopper.	--------	--------	--------	17×21+	14×22+	Neg.
10 cc. N. I. H. serum vial, red rubber stopper.	--------	--------	--------	17×23+	14×18+	6×7±
5 cc. amber glass, black rubber stopper	--------	--------	--------	16×25++	16×20+	Neg.
2 cc. rabies vaccine vial, red rubber stopper.	--------	--------	--------	17×22++	18×19++	4×6±

[1] All ampules broken.

A fifth experiment was set up to test the influence of varying climatic conditions on the diluted toxin. One set of dilutions, ampuled in amber glass vials of poor quality, with red rubber stoppers, was sent by ordinary mail to Honolulu and returned. A second set, ampuled in recovered rabies vaccine vials with red rubber stoppers, received from a commercial laboratory, was sent by ordinary mail to Santiago, Chile, and returned. Each set was tested for potency immediately upon return, 34 and 66 days later, respectively, and then stored at 5° C. until the second retest was made. The results as shown in table 5 are in agreement with those obtained in the previous experiments. No deterioration in the skin reacting factor takes place in those dilutions containing a 1:500 dilution of human serum as contrasted to the almost complete deterioration in the control vials.

TABLE 5.—*Stability of Dick test oxin d luted in buffered saline at various pH levels, with and without human serum, contained in two types of ampules and sent through ordinary mail channels*

pH level of dilutions	To Honolulu and return [1] 2-cc amber ordinary glass vials, red rubber stopper			To Santiago, Chile, and return [2] 2-cc. clear ordinary glass vials, red rubber stopper		
	1 STD of standard control toxin	Dilution containing 1:500 serum	Dilution containing no serum	1 STD of standard control toxin	Dilution containing 1:500 serum	Dilution containing no serum
	FIRST RETEST (ELAPSED TIME 34 DAYS)			FIRST RETEST (ELAPSED TIME 66 DAYS)		
6.6						
6.8		18×18+	6×8±		20×25+	Neg.
7.0		16×18+	5×6±		20×20+	Neg.
7.2		16×25+	6×10±		18×20+	Neg.
7.4		15×20+	10×13±		18×20+	Neg.
	SECOND RETEST (ELAPSED TIME 499 DAYS)			SECOND RETEST (ELAPSED TIME 499 DAYS)		
6.6	15×20+	15×17+	Neg.	16×21+	16×24+	Neg.
6.8	14×17+	14×14+	Neg.	15×18+	14×15+	8×9±.
7.0	18×24+	20×21+	10×10±.	18×25+	20×20+	10×15±.
7.2	16×19+	15×20+	Neg.	17×26+	16×20+	7×9+.
7.4	14×18+	15×18+	Neg.	16×20+	15×22+	11×13±.

[1] These ampules were filled and mailed to an address in Honolulu on Oct. 1, 1937. They were returned on the next mail boat and retested when received on Nov. 4, 1937.

[2] These ampules were filled and mailed to an address in Santiago, Chile, on Oct. 1, 1937, and returned upon receipt. They were received by the National Institute of Health on Dec. 6, 1937, and were retested at once. During the remaining interval, until the second retest on Feb. 15, 1939 (total elapsed time 499 days), all ampules were stored at 5° C.

It should be added that all of the tests recorded in each table, except table 1, were made on the ears of susceptible white rabbits. A control injection of serum diluted without toxin was made in each rabbit and in no instance did this cause a reaction. A series of samples was selected at random at the end of the experiments and titrated against NY-5 antitoxin. The skin reacting factor was completely neutralized, without exception. At the end of the 37° C. incubation

period the toxin in the pH 7.0 amber glass, black rubber stoppered ampule (table 4) with and without serum was tested against a freshly diluted standard control on 18 and 17 pupil nurses, respectively. The reactions were in agreement with those observed on the rabbits and reported in table 4.

CONCLUSIONS

Within the limits of the experiments set up in this study, the data indicate that the presence of 1:500 human serum, when added to the 10-percent phosphate buffer in normal saline commonly used in this country for the preparation of the Dick test toxin, effectively protects the skin reacting factor against deterioration for an interval of time considerably over the present allowable dating period, within a temperature range of 5° to 37° C., and a pH level of 6.6 to 7.4. There is no evidence that the presence of so small a quantity of human serum significantly influences the resulting skin reaction in the human or the rabbit.

CEREBRAL PATHOLOGY IN RODENTS IN ENDEMIC TYPHUS AND ROCKY MOUNTAIN SPOTTED FEVERS [1]

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Focal brain lesions in man in European epidemic exanthematic typhus were described by von Prowazek (*1*), Fraenkel (*2*), Aschoff (*3*), Benda (*4*), Ceelen (*5, 6*), Grzywo-Dabrowsky (*7*), Wolbach, Todd, and Palfrey (*8*), Lupu and Petrescu (*9*), and others.

As the susceptibility of guinea pigs was already known (Nicolle et al., *10*), description of brain lesions in this animal followed at once, and has been repeated by several authors (*6, 7, 8, 11, 12, 13, 14*). Similar lesions in guinea pigs were reported in tabardillo by Mooser (*15*), in Manchurian typhus by Kodama and Takahashi (*16*), in endemic typhus of the eastern United States by Dyer, Ceder, Lillie, Rumreich, and Badger (*17*), and in Malayan shop typhus by Lewthwaite and Savoor (*18*).

In Rocky Mountain spotted fever quite similar lesions were observed in man by Pinkerton and Maxcy (*19*), Lillie (*20*), and Harris (*21*), in São Paulo typhus by Meyer in Gomes' report (*22*), and in Malayan rural typhus by Lewthwaite (*23*); the lesions in guinea pigs have been reported by Lillie (*20*) for eastern spotted fever, by Lewthwaite and Savoor (*24*) for Malayan rural typhus, and by Lillie and Dyer (*25*) for eastern and western spotted fevers.

[1] From the Divisions of Pathology and Infectious Diseases, National Institute of Health. A short paper based on data included in this article was presented at the Third International Congress for Microbiology, Sept. 4, 1939.

Numerous other animals have been shown to be susceptible to the virus of typhus fever, giving either febrile reactions or inapparent infections. Monkeys (*Macacus sinicus*) were used by Nicolle (*26*), (*M. rhesus* and *Cebus capuchinus*) Anderson and Goldberger (*27*), Nicoll, Krumwiede, Pratt, and Bullowa (*28*), *Macacus* in Malayan rural and urban typhus by Lewthwaite and Savoor (*18*, *24*, *29*), a chimpanzee (*Pan satyrus*) by Nicolle (*26*), and gibbons by Lewthwaite and Savoor (*18*, *24*, *29*). Cats (*Felis domesticus*) are reported as susceptible by Lépine and Lorando (*30*), and Le Chuiton, Berge, and Pennanéac'h (*31*), dogs by Nicolle and Conseil in 1912, as insusceptible (*32*), and by Combiesco and Angelesco as susceptible (*33*).

A febrile disease with petechial eruption and Weil Felix reaction is produced by inoculation of the pig (*Sus serofa*) (Violle, *34*).

The ass (*Equus asinus*) was first reported as insusceptible by Nicolle and Conseil (*32*), and later as susceptible by Nicolle and Conseil (*35*), and Blanc and Martin (*36*). Rabbits undergo an inapparent infection and exhibit the Weil Felix reaction (Nicolle and Blaizot, *37*). Nicolle had previously regarded this animal as insusceptible (*32*). Rats present an inapparent infection (Nicolle and Lebailly, *38*, Nicolle, *39*, *40*, Otto and Winkler, *41*). Rats have been repeatedly found infected in nature, both *Rattus norvegicus* and *Rattus rattus rattus*, also *Mus* (*Rattus*?) *gentilis* (*42*) and *Rattus rattus alexandrinus* (*47*).

Other species found susceptible include mice (*Mus musculus*) (Nicolle, *39*, *40*), gerbils or merions (*Meriones shawi*) (Nicolle, *39*, *40*), (Atlas) squirrels (*Xerus* (*Atlantoxerus*) *getulus*) (Blanc, Noury, and Baltazard, *44*), and spermophiles or ground squirrels (*Citellus citellus*) (Lépine, *45*, Combiesco et al., *46*, Jelin and Grossman, *47* (Odessa ground squirrel)). Bruynoghe and Jadin (*43*) reported the susceptibility of the meadow mouse (*Arvicola arvalis*) and the dwarf mouse (*Mus minutus*); Ronse (*48*) of hedgehogs and garden mice (lérot: *Myoxus nitela*). Dyer (*49*) reported susceptibility of mice (*Mus musculus musculus*), woodchucks (*Marmota monax monax*), meadow mice (*Microtus pennsylvanicus pennsylvanicus*), and white-footed mice (*Peromyscus leucopus noveboracensis*); Brigham (*50*) of opossums (*Didelphys virginiana*) and (*51*) of cats (*Felis domestica*), old-field mice (*Peromyscus polionotus polionotus*), and cotton mice (*Peromyscus gossypinus gossypinus*) with apparent infections, and wood rats (*Neatoma floridana rubida*), cotton rats (*Sigmodon hispidus hispidus*), rice rats (*Oryzomys palustris palustris*), and flying squirrels (*Glaucomys volans saturatus*) with inapparent infections. The infection in nature of the old-field mouse was reported by the same author (*52*). Brigham (*53*) further recorded inapparent infections in gray and fox squirrels (*Sciurus carolinensis carolinensis* and *Sciurus niger niger*), 1 of 4 swamp rabbits (*Sylvilagus aquaticus aquaticus*), a chipmunk

(*Tamias striatus striatus*), and a skunk (*Mephitis elongata*). Abortion and death on the fifth day with recovery of virus were recorded for one cottontail rabbit (*Sylvilagus floridanus mallurus*). The gray fox (*Urocyon cinereoargenteus cinereoargenteus*) was recorded as insusceptible.

Among all these susceptible species histologic lesions in the brain have been reported, aside from the guinea pig, only in the Macedonian spermophile (*44*) or Odessa ground squirrel (*46*), and in the cat (*30*). In the latter, Lépine and Lorando noted a "minimal reaction," a meningeal reaction predominantly in septa and a slight subcortical infiltration. The reaction was mononuclear ("monocytaire"). No typhus nodes or vasculitis were observed. Lépine's Macedonian spermophiles showed cerebral congestion with perivascular infiltration. Jelin and Grossman described a perivascular lymphocyte and plasma cell infiltration and typhus "nodes" in the brain of the Odessa ground squirrel after 6 to 7 days of fever. Similar lesions appeared earlier in liver, lung, and spleen, and later in the heart.

Following Brigham's demonstration of the susceptibility and occasional natural infection of the old-field mouse (*Peromyscus polionotus polionotus*) (*51, 52*), a series of these mice was inoculated with the Wilmington strain of guinea pig passage endemic typhus virus and killed when the simultaneously inoculated guinea pigs reached the eleventh day of fever, at which time the brain reaction was expected to be at its maximum in the guinea pigs (Lillie and Dyer, *25*). When brain lesions were found in 6 of 11 of these captured wild mice, it was determined to explore the brain reaction in other species of susceptible native rodents.

Typhuslike paravascular glia nodes and intracerebral vasculitis of mixed proliferative and perivascular exudative type were encountered in 6 of 11 old-field mice (*Peromyscus polionotus polionotus*), 5 of 7 white-footed mice (*Peromyscus leucopus noveboracensis*), both of 2 *Peromyscus eremicus eremicus*, all of 7 deer mice (*Peromyscus maniculatus gambelii*), none of 4 cotton mice (*Peromyscus gossypinus gossypinus*), both of 2 *Reithrodontomys* sp., all of 7 gray mice (*Mus musculus musculus*), all of 9 white mice (*Mus musculus musculus albinus*), and 7 of 12 white rats (*Rattus norvegicus albinus*).

The time of the killing of these mice for study of the brain reaction was based on the supposition that the incubation period and the evolution of lesions would be similar to the process in guinea pigs. To test this hypothesis further, a series of 32 white mice was inoculated with guinea pig testicular washings of the Wilmington strain and 4 were killed each day 8, 11, 12, 14, 16, 18, and 22 days later.

Five transverse sections of each of the 32 brains were made through the frontal area, the thalamic area, the midbrain, the pons and cerebellum, and the enlargement of the medulla. The total number of focal

lesions for each mouse were counted in these sections, and the totals averaged for each day. It was found that the maximum average counts were obtained on the fourteenth and sixteenth days.

TABLE 1.—*Variation of number of focal lesions in mouse brains according to the length of time after inoculation with endemic typhus*

Day killed	Individual counts	Aggregate	Average
8	1, 10, 4, 3	18	4.50
11	0, 47, 31, 1	79	19.75
12	10, 26, 16, 69	121	30.25
14	196, 24, 48, 11	279	69.75
16	12, 149, 24, 31	214	53.50
18	75, 4, 2, 37	115	28.75
20	1, 4, 1, 61	67	16.75
22	3, 3, 22, 5	33	8.25

This corresponds approximately to the estimate based on the reactions in guinea pigs.

On comparing the detailed pathology in white mice with that in guinea pigs (*25*), it appears that vascular lesions, and particularly proliferative vascular lesions, are relatively more frequent in *M. musculus*, and the paravascular glia nodes less frequent, that focal lesions are relatively less numerous in cerebral cortex and more numerous in midbrain and hindbrain, that the great preponderance of nodes in the cerebellar cortex in guinea pigs is replaced by a preponderance of vascular lesions in mice, that in place of a preponderance of vascular lesions in the corpora striata the type distribution of lesions in mice is about average. These findings are given in table 2. Among 93 sections of chorioid plexus shown, 13 presented slight lymphocyte infiltration; 80 were negative. Meninges usually showed slight lymphocyte infiltration. Capillary thrombosis was recorded once.

The 10 gray mice (*M. musculus musculus*) studied showed an even greater preponderance of vascular lesions (57.3 percent perivascular lymphocyte infiltration, 24.4 percent endothelial proliferative, and only 18.3 percent paravascular glia nodes), and greater shift in lesion distribution toward the hindbrain at the expense of the cerebral cortical lesions. Chorioid plexal infiltration was rare, meningeal lymphocyte infiltration slight, and capillary thrombosis absent.

The white rats (*Rattus norvegicus albinus*) were inoculated during July 1939, and killed on the fourteenth and sixteenth days. As expected from the behavior of the disease in guinea pigs during the summer, lesions were few or often absent. However, some typical paravascular glia cell nodules were seen, perivascular lymphocyte infiltration was present, and the most prominent intracerebral lesion was a concentric proliferation of fusiform adventitia cells of scattered small vessels, compressing or obliterating the lumen. Lesions tended to occur most often in midbrain and hindbrain. Chorioid plexal

FIGURE 1a.—Endemic typhus, node and vascular lesions, temporal cortex, white mouse 14702 (X 435.)

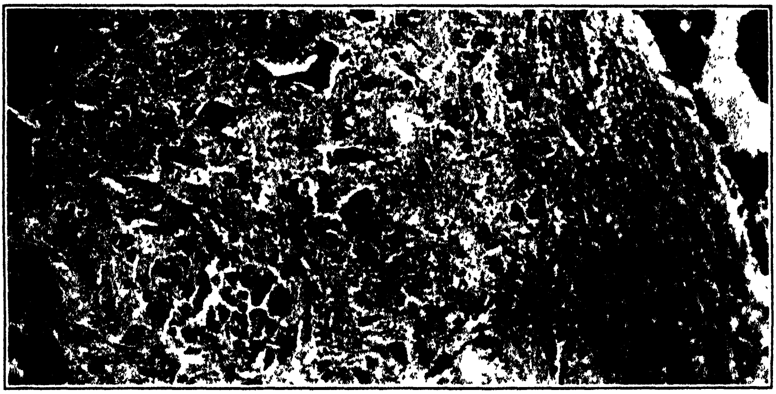

FIGURE 1b—Endemic typhus, node, medulla, white mouse 14676. (X 435.)

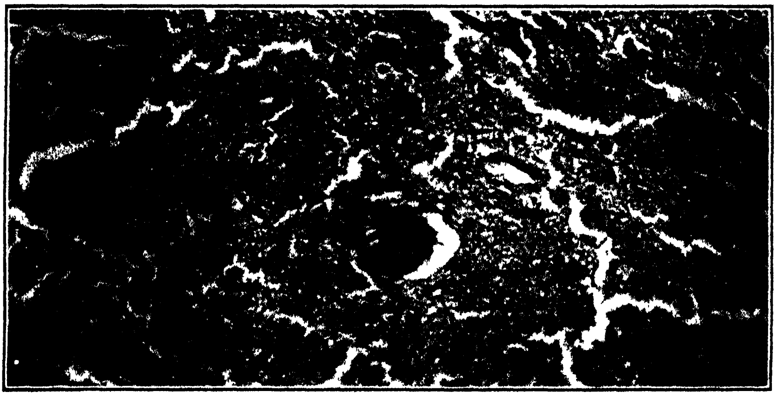

FIGURE 1c.—Endemic typhus, concentric vascular proliferation, thalamus, white mouse 14676. (X 435.)

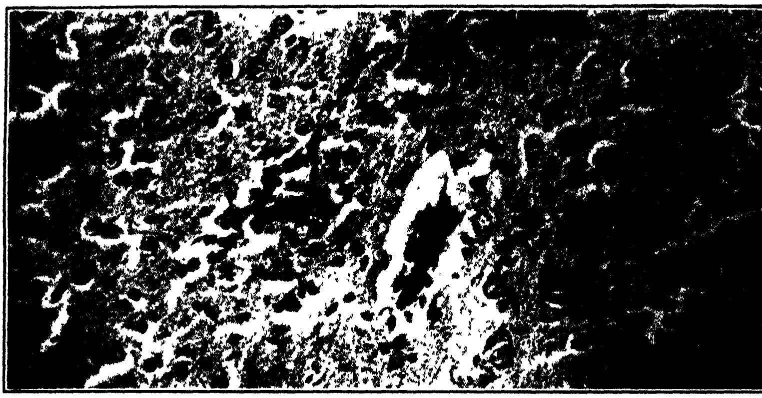

FIGURE 2a.—Spotted fever, node and vascular lesion, thalamus, white mouse 14326. (X 435.)

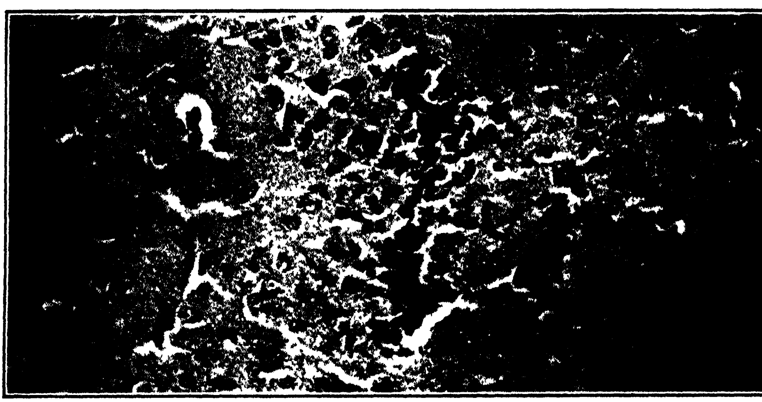

FIGURE 2b.—Spotted fever, node and vessel, hypothalamus, white mouse 14326 (X 435.)

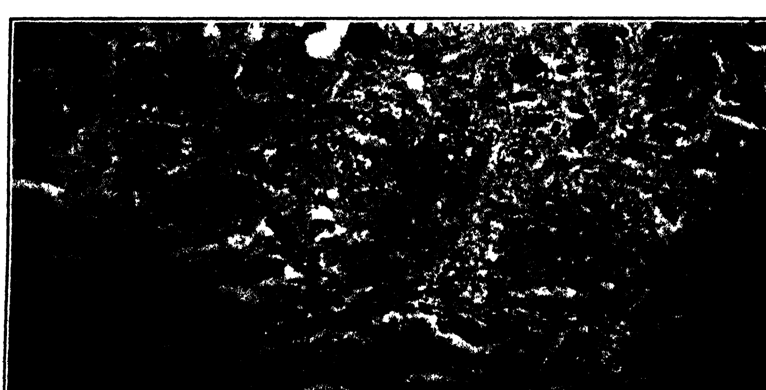

FIGURE 2c.—Spotted fever, concentric vascular proliferation, medulla, white mouse 14327. (X 435.)

infiltration was absent, meningeal reaction very slight, and capillary thrombosis was not observed. Rats killed on the sixteenth day showed more lesions than those killed on the fourteenth day.

TABLE 2.—*Topographic distribution and types of brain lesions of endemic typhus in guinea pigs and various species of mice*

Species and type of lesion	Aggregate number of focal lesions										
	Cerebral cortex				Cerebral nuclei		Midbrain and hindbrain				
	Frontal	Parietal	Temporal	Hippocampus	Corpora striata	Thalamus	Midbrain	Pons	Medulla	Cerebellum	Total
Guinea pigs (391), ref. (*25*):											
Perivascular lymphocyte	1,083	734	222	520	571	509	262	259	215	76	4,451
Proliferative vascular	319	184	48	106	66	141	115	56	78	66	1,179
Total vascular	1,402	918	270	626	637	650	377	315	293	142	5,630
Glia nodes	1,002	854	328	485	171	410	378	288	280	324	4,520
Total focal	2,404	1,772	598	1,111	808	1,060	755	603	573	466	10,150
White mice (30):											
Perivascular lymphocyte	99	39	23	35	36	41	37	39	22	76	447
Proliferative vascular	44	21	14	13	20	23	11	9	5	11	171
Total vascular	143	60	37	48	56	64	48	48	27	87	618
Glia nodes	79	29	18	8	27	21	22	25	14	11	254
Total focal	222	89	55	56	83	85	70	73	41	98	872
Peromyscus polionotus polionotus (5):											
Perivascular lymphocyte	10	2	1	16	4	1	6	6	0	0	46
Proliferative vascular	4	1	0	5	0	2	5	3	0	0	20
Total vascular	14	3	1	21	4	3	11	9	0	0	66
Glia nodes	17	6	4	13	2	3	8	9	0	4	66
Total focal	31	9	5	34	6	6	19	18	0	4	132
Peromyscus maniculatus gambelii (7):											
Perivascular lymphocyte	31	9	5	14	14	44	15	17	7	8	164
Proliferative vascular	16	9	1	8	4	11	5	1	5	2	62
Total vascular	47	18	6	22	18	55	20	18	12	10	226
Glia nodes	55	29	12	24	15	36	20	18	12	16	237
Total focal	102	47	18	46	33	91	40	36	24	26	463
Peromyscus leucopus noveboracensis (5):											
Perivascular lymphocyte	9	9	1	2	3	6	10	6	13	0	59
Proliferative vascular	16	7	5	4	2	7	8	7	7	3	66
Total vascular	25	16	6	6	5	13	18	13	20	3	125
Glia nodes	31	17	10	14	5	21	36	24	17	9	184
Total focal	56	33	16	20	10	34	54	37	37	12	309

TABLE 2.—*Topographic distribution and types of brain lesions of endemic typhus in guinea pigs and various species of mice*—Continued

Species and type of lesion	Percentages of focal lesions										
	Cerebral cortex				Cerebral nuclei		Midbrain and hind-brain				
	Frontal	Parietal	Temporal	Hippocampus	Corpora striata	Thalamus	Midbrain	Pons	Medulla	Cerebellum	Total
Guinea pigs (391), ref. (25):											
Perivascular lymphocyte	10.7	7.2	2.2	5.1	5.6	5.0	2.6	2.6	2.1	0.8	43.8
Proliferative vascular	3.1	1.8	0.5	1.0	0.7	1.4	1.1	0.5	0.8	0.6	11.6
Total vascular	13.8	9.0	2.7	6.1	6.3	6.4	3.7	3.1	2.9	1.4	55.4
Glia nodes	9.9	8.4	3.2	4 8	1.7	4.0	3.7	2.8	2.8	3.3	44.6
Total focal	23.7	17.5	5 9	10.9	8.0	10 4	7.4	5.9	5.6	4.7	100 0
White mice (30):											
Perivascular lymphocyte	11.4	4.5	2.6	4.0	4.1	4.7	4.2	4 5	2 5	8.5	51.2
Proliferative vascular	5 0	2.4	1 6	1.5	2.3	2.6	1.3	1.0	0.6	1.3	19 6
Total vascular	16.4	6 9	4.2	5.5	6.4	7.3	5.5	5.5	3.1	9.8	70.9
Glia nodes	9 1	3.3	2.1	0.9	3.1	2.4	2 5	2.9	1.6	1 3	29 1
Total focal	25.5	10.2	6.3	6.4	9.5	9.7	8.0	8.4	4.7	11.2	100.0
Peromyscus polionotus polionotus (5):											
Perivascular lymphocyte	7.5	1.5	0.8	12.1	3.1	0.8	4 5	4.5	0	0	34.8
Proliferative vascular	3.1	0.8	0.0	3.8	0	1.5	3.8	2.3	0	0	15.2
Total vascular	10.6	2.3	0.8	15.9	3.1	2.3	8.3	6 8	0	0	50 0
Glia nodes	12.9	4.5	3.1	9 8	1.5	2.8	6.1	6.8	0	3.1	50.0
Total focal	23.5	6.8	3.8	25.7	4.5	4.5	14.4	13.7	0	3.1	100.0
Peromyscus maniculatus gambelii (7):											
Perivascular lymphocyte	6.7	1.9	1.1	3.0	3.0	9.5	3.2	3.7	1.5	1.7	35 4
Proliferative vascular	3.5	1.9	0.2	1.7	0 9	2.4	1.1	0 2	1.1	0 4	13.4
Total vascular	10.2	3.8	1.3	4.7	3.9	11.9	4.3	3.9	2.6	2.1	48 8
Glia nodes	11.9	6.3	2.6	5.2	3.2	7.8	4.3	3.9	2.6	3 4	51.2
Total focal	22.0	10.1	3.9	9.9	7.1	19.7	8.6	7.8	5.2	5.6	100 0
Peromyscus leucopus noveboracensis (5):											
Perivascular lymphocyte	2.9	2.9	0.3	0.6	1.0	1.9	3.2	1.9	4.2	0	19.1
Proliferative vascular	5.2	2.3	1.6	1.3	0.6	2.8	2.6	2.3	2.3	0 9	21.4
Total vascular	8.1	5.2	1.9	1.9	1.6	4.2	5.8	4.2	6.5	0.9	40 5
Glia nodes	10.0	5.5	3.2	4.5	1.6	6.8	11.7	7.8	5.5	2 9	59 5
Total focal	18.1	10.7	5.2	6.5	3.2	11.0	17 5	12.0	12.0	3.9	100 0

In old-field mice (*P. polionotus polionotus*), the type distribution of lesions is more like that in guinea pigs, the nodal type of lesion being somewhat more frequent and the perivascular lymphocyte infiltration less frequent. More of the vascular lesions are of the endothelial swelling and proliferation type. Capillary thrombosis was noted twice. The proportion of lesions occurring in the cerebral cortex is about the same as in the guinea pig, that in the cerebral nuclei less, and that in midbrain and hindbrain more, particularly in midbrain and pons. As in the guinea pig, vascular lesions predominate in the corpora striata and "nodes" in the cerebellum. Focal lymphocyte infiltration of chorioid plexus was not infrequent, and meningeal infiltration was regularly present.

In *P. maniculatus gambelii*, the frequency of the types of lesions is essentially similar to that in old-field mice, while the topographic

distribution is more like that in *M. musculus*, with about the same proportion of cortical lesions, more in basal nuclei and fewer in the hindbrain. Capillary thrombi were recorded 6 times. Meningeal lymphocyte infiltration was regularly present, and few foci of lymphocyte infiltration were seen in chorioid plexus.

In the white-footed mice (*P. leucopus noveboracensis*), the greatest concentration of lesions in midbrain and hindbrain is seen, and capillary endothelial swelling and proliferation are more frequent than vessel sheath lymphocyte infiltration. In this species the paravascular nodes comprise the highest proportion of the total focal lesions seen. Capillary thrombi were not recorded. Meningeal lymphocyte infiltration was usually present, chorioid plexal occasionally.

In the 2 *Peromyscus eremicus eremicus*, the brain reactions were scanty. The usual types of lesions, nodes, and vessels with sheath lymphocyte infiltration were present, and focal lymphocyte infiltration was noted in meninges and chorioid plexus.

In lesion types, the 2 *Reithrodontomys* sp. seemed similar to the *P. leucopus noveboracensis* in showing more "nodes" than vascular lesions and more endothelial swelling and proliferation than sheath lymphocyte infiltration. There was also some tendency to increased frequency in lesions in the hindbrain. Capillary thrombi were not seen, plexal infiltration was not noted, and meningeal lymphocyte infiltration was present.

Guinea pigs and rhesus monkeys were shown to be susceptible to Rocky Mountain spotted fever (Ricketts, *54*, King, *55*). Later Ricketts (*56*) found gophers, or ground squirrels, and horses susceptible. Rabbits had been inoculated by Wilson and Chowning in 1904, and their susceptibility was confirmed by Ricketts and Gomez (*58*) and Gomez (*59*). Ricketts (*60*) further reported susceptibility of ground hogs, rock squirrels, chipmunks, and mountain rats. McClintic (*61*) reported as susceptible the Columbian ground squirrel (*Citellus columbianus*), and 1 of 4 badgers (*Taxidea taxus*), and noted the infectivity of the blood of inoculated weasels (*Putorius arizonensis*) 5 but not 10 days after infection. Later (*62*) he reported the woodchuck (*Marmota flaviventris*) and the rock squirrel (*Callospermophilus lateralis cinerascens*) as susceptible. Coyotes and cats were resistant.

Rucker (*63*) listed the susceptible animals known in 1912, adding the wood rat (*Neotoma cinerea*) which had been suggested by Ricketts (*60*), and the cottontail rabbit (*Sylvilagus nuttalli*), and further classing the chipmunks as yellow bellied and white bellied (*Eutamias luteiventris* and *E. quadrivittatus umbrinus*). Fricks (*64*) noted that white rats (*Rattus norvegicus albinus*) were highly susceptible but white mice were resistant. Badger (*65*) recovered spotted fever virus from inoculated dogs (*Canis familiaris*) and a lamb (*Ovis aries*). Pups had fever, the lamb and adult dogs had none. Jellison (*66*) recovered

spotted fever virus up to the tenth day from meadow mice (*Microtus pennsylvanicus modestus*) and once from a dwarf mouse (*Microtus nanus*). He obtained similar results from deer mice (*Peromyscus maniculatus artemisiae*) but was unable to recover virus from inoculated gray mice (*Mus musculus*).

Travassos (*67*) reported 3 passages of São Paulo typhus virus through rats, and noted that Monteiro (*68*) had recovered this virus from wild and white rats after one passage.

In spite of the accumulation of reports of insusceptibility of *Mus musculus* to spotted fever (*64, 66*), we again tried this species but did not recover the virus in guinea pigs. Brain reactions were produced in some mice and not in others. In one lot of 7 mice inoculated with guinea pig passage virus and killed 16 days later, 2 showed no lesions, 1 showed a few, there were moderate reactions in 3, and in 1 the reaction was graded as ++. In a second lot of 5 mice, 2 showed no lesions, 2 slight reactions, and 1 a ++ reaction. In 2 mice inoculated with first passage mouse brain, marked reactions were obtained, but virus was not recovered in simultaneously inoculated guinea pigs. Brains of mice inoculated with mouse brain passage virus occasionally showed slight to moderate reactions up to the fifth mouse passage, but none thereafter. A total of 45 mouse brains was studied in this series.

Of the focal lesions 38.3 percent occurred in cerebral cortex, 20.2 percent in thalamus and basal ganglia, and 41.5 percent in midbrain and hindbrain. In typhus fever in white mice the corresponding figures are 48.4, 19.2, and 32.3 percent, showing the same type of distribution difference reported previously in guinea pigs.

As regards type, half (50.6 percent) of the lesions were perivascular lymphocyte infiltration, 12.8 percent endothelial and adventitial vascular proliferation, and 36.6 percent "nodes."

The nodes are fairly compact and well limited nodules of loosely packed, interstitially placed, almost naked, darkly staining, rounded and elongated, leptochromatic glia nuclei. Some nodules are composed of larger, apparently foamy, and more closely packed cells. The nodes are often evidently paravascular in location. Chorioid plexus was observed in 138 locations and in 13 showed slight, focal, or moderate lymphocyte infiltration. Meninges generally showed slight diffuse or focal lymphocyte infiltration.

To explore further the production of brain reactions to Bitterroot strains of spotted fever, a series of laboratory reared wild rodents was inoculated in July 1939, and killed usually 12 days later. Results are shown in table 3.

TABLE 3.—*Brain reactions in wild rodents inoculated with Bitterroot spotted fever virus and killed 12 days later*

Species	Number of mice	Number of lesions counted in 5 cross sections
White mouse (*Mus musculus albinus*)	6	0, 0, 3, 0, 1, 0.
White rat (*Rattus norvegicus albinus*)	6	0, 0, 2, 0, 1, 1.
Cotton rat (*Sigmodon hispidus hispidus*)	5	0, 0, 0, 2, 0.
Desert mouse (*Peromyscus eremicus eremicus*)	5	0, 0, 1, 0, 0.
Cotton mouse (*Peromyscus gossypinus gossypinus*)	6	0, 0, 0, 0, 1, 12.
Deer mouse (*Peromyscus maniculatus gambelii*)	6	0, 0, 0, 0, 0, 0.
Old-field mouse (*Peromyscus polionotus polionotus*)	5	0, 0, 0, 0. 0.
White-footed mouse (*Peromyscus leucopus noveboracensis*)	5	0, 0, 0, 1, 0.
Meadow mouse (*Microtus pennsylvanicus pennsylvanicus*)	5	6, 3, 5, 5, 3.

Reactions were negligible or absent except in one cotton mouse and in the meadow mice. Since these inoculations were made in July and it has been shown that endemic typhus gives its minimum brain reactions in guinea pigs during the hot months (*69*), it would seem advisable to repeat this experiment later in the year.

It is interesting to observe that the brain lesions in *Microtus* were predominantly in the midbrain and hindbrain (16 lesions, 4 in cerebral cortex, 2 in thalamus and basal ganglia). Of the 22 lesions, 2 were perivascular lymphocyte infiltration, 8 were vascular endothelial and adventitial swelling and proliferation, and 12 were "nodes." Meningeal lymphocyte infiltration and vascular proliferative reactions were scanty, and chorioid plexal involvement was absent.

CONCLUSION

Characteristic typhus nodes and vascular lesions are produced in the brain in endemic typhus fever in the old-field mouse (*Peromyscus polionotus polionotus*), the white-footed mouse (*P. leucopus noveboracensis*), in the desert mouse (*P. eremicus eremicus*), in the deer mouse (*P. maniculatus gambelii*), in *Reithrodontomys* sp., in gray and white mice (*Mus musculus*), and in the white rat (*Rattus norvegicus albinus*). No lesions were seen in inoculated cotton mice (*Peromyscus gossypinus gossypinus*). The lesions in these rodents are comparable to those seen in guinea pigs, but vary in proportion of lesion types and in distribution from species to species.

In Rocky Mountain spotted fever similar lesions are irregularly and inconstantly, but rather frequently, produced in white mice, and scanty reactions are seen in meadow mice (*Microtus pennsylvanicus pennsylvanicus*) and in an occasional cotton mouse (*Peromyscus gossypinus gossypinus*).

The increase in relative frequency of midbrain and hindbrain lesions noted in guinea pigs in spotted fever as compared with typhus is noted also in white mice. The greatest number of brain lesions in

endemic typhus in white mice are seen 14 to 16 days after inoculation, which corresponds closely to the time of maximum cerebral reaction in guinea pigs.

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DEATHS DURING WEEK ENDED NOVEMBER 11, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 11, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,704	7,362
Average for 3 prior years	[1] 7,874	
Total deaths, first 45 weeks of year	370,242	363,975
Deaths under 1 year of age	432	420
Average for 3 prior years	[1] 496	
Deaths under 1 year of age, first 45 weeks of year	22,339	23,564
Data from industrial insurance companies:		
Policies in force	66,569,616	68,295,010
Number of death claims	9,407	7,752
Death claims per 1,000 policies in force, annual rate	7.4	5.9
Death claims per 1,000 policies, first 45 weeks of year, annual rate	9.9	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (---) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 18, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median
NEW ENG.												
Maine	12	2	6	2	6	1	3	1	115	19	46	28
New Hampshire	0	0	0	0	------	------	------	------	41	4	0	3
Vermont	0	0	0	1	------	------	------	------	550	41	2	3
Massachusetts	11	9	5	8	------	------	------	------	323	275	177	82
Rhode Island	0	0	0	1	------	------	------	------	443	58	0	2
Connecticut	0	0	4	8	------	------	3	4	134	45	62	52
MID. ATL.												
New York [3]	8	19	24	25	[1] 8	[1] 11	[1] 11	[1] 11	60	149	315	315
New Jersey	32	27	13	17	19	16	10	9	20	17	18	41
Pennsylvania	35	69	54	54	------	------	------	------	20	39	66	69
E. NO. CEN.												
Ohio	37	48	46	57	26	34	------	32	21	27	15	63
Indiana	31	21	13	39	1	1	3	23	40	27	18	18
Illinois	26	89	46	46	7	10	27	22	18	28	32	32
Michigan [3]	6	6	29	29	------	------	------	1	169	160	54	46
Wisconsin	0	0	2	3	49	28	83	33	62	35	98	56
W. NO. CEN.												
Minnesota	0	0	7	7	------	------	2	1	169	87	156	45
Iowa	6	3	24	18	------	------	3	3	34	17	50	5
Missouri	19	15	29	55	------	------	4	41	12	9	7	81
North Dakota	7	1	9	5	37	5	4	4	15	2	389	11
South Dakota	8	1	3	3	23	3	2	------	38	5	43	4
Nebraska	8	2	6	6	------	------	1	------	8	2	1	3
Kansas	11	4	18	26	11	4	8	5	190	68	11	11
SO. ATL.												
Delaware	20	1	1	1	------	------	------	------	0	0	2	2
Maryland [3]	22	7	14	21	22	7	7	5	6	2	56	28
Dist. of Col	16	2	11	11	------	------	2	1	8	1	2	1
Virginia	127	68	85	72	167	89	118	------	21	11	37	37
West Virginia	40	15	12	35	35	13	10	21	5	2	17	23
North Carolina [4]	171	117	117	80	7	5	7	7	150	103	194	94
South Carolina [4]	66	24	16	15	1,306	478	284	284	14	5	4	6
Georgia [4]	48	29	14	41	196	118	31	------	15	9	13	0
Florida [4]	24	8	12	15	9	3	3	3	12	4	32	6

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 18, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median
E. SO. CEN.												
Kentucky	28	16	34	34	111	64	21	15	7	4	12	12
Tennessee [4]	60	34	22	50	67	38	38	38	16	9	6	6
Alabama [4]	95	54	31	44	326	185	55	55	7	4	12	6
Mississippi [3]	46	18	14	14								
W. SO. CEN.												
Arkansas	57	23	29	16	134	54	69	13	7	3	15	1
Louisiana [4]	22	9	18	25	24	10	3	4	2	1	50	8
Oklahoma	30	15	31	25	68	34	57	42	10	5	19	4
Texas [4]	38	46	84	61	205	247	220	127	12	14	5	14
MOUNTAIN												
Montana	9	1	1	1	1,236	132		3	206	22	113	23
Idaho	0	0	0	0				3	10	1	55	7
Wyoming	22	1	0	0					196	9	4	4
Colorado	24	5	16	9	63	13	22		221	46	11	11
New Mexico	12	1	6	6	12	1			86	7	3	18
Arizona	86	7	4	4	773	63	116	41	37	3	2	2
Utah [3]	0	0	3	2	50	5	6		864	87	7	13
PACIFIC												
Washington	3	1	8	1			2		811	263	15	30
Oregon	10	2	3	2	89	18	11	27	94	19	8	16
California [4]	26	32	34	51	17	21	33	34	133	162	449	50
Total	32	802	953	1,064	81	1,711	1,229	970	77	1,910	2,703	2,703
46 weeks	18	20,388	25,447	25,447	165	160,713	56,018	110,893	316	359,527	775,362	687,530

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	48	8	4	20
New Hampshire	0	0	0	0	0	0	0	0	0	0	7	7
Vermont	0	0	0	0	0	0	1	0	0	0	4	7
Massachusetts	0	0	0	2	2 4	2	0	2	96	82	72	125
Rhode Island	0	0	1	0	0	0	0	0	23	3	5	12
Connecticut	0	0	0	0	0	0	0	0	104	35	42	38
MID. ATL.												
New York [3]	0	0	3	5	7	18	2	7	94	236	249	288
New Jersey	0	0	0	1	6	5	2	2	123	103	85	85
Pennsylvania	2	4	6	2	8	15	4	3	207	408	312	340
E. NO. CEN.												
Ohio	0	0	0	4	5	7	0	0	250	325	249	270
Indiana	0	0	1	1	1.5	1	0	1	248	167	150	161
Illinois	2.6	4	1	4	3	5	1	3	197	300	287	355
Michigan [3]	0	0	0	2	6	6	1	5	303	287	423	252
Wisconsin	0	0	0	0	9	5	1	1	206	117	123	203
W. NO. CEN.												
Minnesota	0	0	0	1	8	4	0	2	196	101	84	121
Iowa	0	0	0	1	24	12	0	2	105	52	70	70
Missouri	1.3	1	0	1	0	0	2	2	87	68	114	114
North Dakota	0	0	0	0	0	0	0	0	256	35	24	43
South Dakota	0	0	0	0	8	1	0	0	150	20	34	34
Nebraksa	0	0	0	0	11	3	0	1	65	17	25	33
Kansas	0	0	0	0	0	0	0	1	254	91	135	118

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 18, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934–38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934–38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	0	0	1	0	177	9	9	7
Maryland [3]	0	0	0	1	6	2	0	1	139	45	40	80
Dist. of Col	0	0	0	8	24	3	0	0	49	6	10	12
Virginia	4	2	3	8	0	0	2	1	101	54	60	60
West Virginia	0	0	0	1	19	7	0	0	218	81	86	102
North Carolina [4]	2.9	2	1	2	4	3	1	1	206	141	72	72
South Carolina [4]	0	0	1	1	2.7	1	2	0	85	31	13	12
Georgia [4]	0	0	1	0	0	0	1	1	70	42	38	32
Florida [4]	3	1	1	1	0	0	1	1	48	16	22	2
E. SO. CEN.												
Kentucky	1.7	1	6	5	16	9	1	2	149	86	96	69
Tennessee [4]	0	0	2	3	1.8	1	1	1	125	71	91	91
Alabama [4]	4	2	5	4	5	3	0	1	95	54	26	27
Mississippi [3]	0	0	0	0	5	2	1	1	48	17	11	13
W. SO. CEN.												
Arkansas	2.5	1	1	0	5	2	1	1	52	21	29	19
Louisiana [4]	2.4	1	0	1	0	0	0	2	34	14	26	20
Oklahoma	0	0	0	0	2	1	1	1	46	23	46	23
Texas [4]	0.8	1	0	1	3	6	1	2	42	51	97	66
MOUNTAIN												
Montana	0	0	1	0	0	0	0	0	318	34	26	32
Idaho	20	2	0	0	20	2	1	0	61	6	13	21
Wyoming	0	0	0	0	0	0	0	0	109	5	5	15
Colorado	0	0	0	0	0	0	0	4	207	43	28	42
New Mexico	12	1	0	0	37	3	0	0	136	11	20	23
Arizona	0	0	0	0	0	0	0	0	110	9	5	17
Utah [3]	0	0	0	0	60	6	0	0	149	15	12	31
PACIFIC												
Washington	3	1	0	0	3	1	0	1	111	36	43	43
Oregon	5	1	1	1	5	1	0	8	80	16	42	39
California [4]	2.5	3	1	1	21	26	1	12	147	179	209	209
Total	1.1	28	36	63	6	163	30	91	142	3,571	3,673	4,276
46 weeks	1.5	1,758	2,589	4,930	6	[5] 6,802	1,596	6,962	121	140,137	164,148	195,700

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934–38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934–38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases
NEW ENG.											
Maine	0	0	0	0	12	2	1	1	217	36	19
New Hampshire	0	0	0	0	0	0	0	0	41	4	0
Vermont	0	0	0	0	0	0	0	1	791	59	0
Massachusetts	0	0	0	0	1	1	1	1	158	134	134
Rhode Island	0	0	0	0	0	0	2	1	191	25	41
Connecticut	0	0	0	0	6	2	4	2	214	72	65
MID. ATL.											
New York [3]	0	0	0	0	2	5	8	11	141	352	659
New Jersey	0	0	0	0	2	2	1	5	188	158	394
Pennsylvania	0	0	0	0	5	10	31	23	160	315	438

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 18, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases	1934-38, median	Nov. 18, 1939, rate	Nov. 18, 1939, cases	Nov. 19, 1938, cases
E. NO. CEN.											
Ohio	2	2	1	1	8	10	12	11	188	245	152
Indiana	1	1	10	2	4	3	1	1	64	43	14
Illinois	1	1	2	2	5	8	16	15	131	200	501
Michigan [3]	11	10	14	1	2	2	8	8	118	112	295
Wisconsin	5	3	2	2	0	0	1	1	239	136	435
W. NO. CEN.											
Minnesota	25	13	4	4	0	0	0	1	81	42	37
Iowa	32	16	3	3	4	2	3	3	12	6	29
Missouri	3	2	41	4	15	12	2	5	13	10	22
North Dakota	0	0	12	10	0	0	3	2	95	13	8
South Dakota	15	2	0	2	0	0	1	1	0	0	5
Nebraska	0	0	0	0	8	2	1	1	19	5	18
Kansas	8	1	3	2	8	3	1	5	48	17	20
SO. ATL.											
Delaware	0	0	0	0	39	2	0	2	354	18	6
Maryland [3]	0	0	0	0	12	4	5	8	148	48	34
Dist. of Col.	0	0	0	0	16	2	1	1	89	11	9
Virginia	0	0	0	0	15	8	7	7	43	23	44
West Virginia	0	0	0	0	19	7	6	7	30	11	36
North Carolina [4]	1	1	0	0	1	1	10	4	114	78	272
South Carolina [4]	0	0	0	0	38	14	3	3	16	6	35
Georgia [4]	2	1	0	0	17	10	13	6	23	14	15
Florida [4]	0	0	0	0	9	3	6	8	33	11	17
E. SO. CEN.											
Kentucky	0	0	10	0	9	5	12	14	101	58	26
Tennessee [4]	0	0	1	1	2	1	5	11	115	65	23
Alabama [4]	2	1	0	0	4	2	3	6	25	14	44
Mississippi [3]	0	0	0	0	8	3	1	4			
W. SO. CEN.											
Arkansas	0	0	1	0	25	10	3	4	37	15	15
Louisiana [4]	0	0	0	1	17	7	18	11	12	5	8
Oklahoma	4	2	4	1	6	3	13	11	0	0	7
Texas [4]	0	0	0	1	12	14	32	32	46	55	77
MOUNTAIN											
Montana	0	0	2	8	9	1	6	4	19	2	36
Idaho	10	1	0	0	20	2	8	2	0	0	2
Wyoming	22	1	0	2	0	0	0	0	22	1	1
Colorado	5	1	1	3	10	2	1	0	111	23	43
New Mexico	0	0	0	0	12	1	5	9	395	32	9
Arizona	0	0	1	0	25	2	6	1	61	5	2
Utah [3]	0	0	1	0	10	1	1	0	616	62	25
PACIFIC											
Washington	3	1	1	10	9	3	5	3	83	27	63
Oregon	0	0	8	0	30	6	3	3	109	22	1
California [4]	1	1	2	1	15	18	9	9	92	112	108
Total	2	61	124	124	8	196	279	279	109	2,702	4,244
46 weeks	8	9,062	13,395	6,579	10	11,922	13,404	14,121	138	157,405	187,136

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Nov. 18, 1939, New York, 1 case.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Nov. 18, 1939, 64 cases as follows: North Carolina, 1; South Carolina, 6; Georgia, 30; Florida, 2; Tennessee, 3; Alabama, 10; Louisiana, 2; Texas, 8; California, 2.
[5] Diagnosis was changed on 1 case reported as poliomyelitis in Pennsylvania during the week ended October 14, Public Health Reports of October 27, p. 1939.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
October 1939										
Alabama	146	129	1,036	16	10	25	4	179	0	20
Arizona	13	207	2	8	1	1	9	22	0	9
Colorado	44	36	1	57	2		40	102	20	23
Idaho	0	1		17	1		8	27	1	8
Kentucky	81	11	9	36	4	1	50	231	0	49
Maryland	38	35	1	20	1	4	10	160	0	30
Minnesota	17	9		28	1		115	164	5	2
Nebraska	8			14	1		6	49	1	1
New Mexico	8	4	1	6	0	1	43	35	0	30
New York	50		11	851	8		235	481	0	74
Pennsylvania	97		1	117	16		120	794	0	58
South Dakota	9	13		100	0		11	87	1	1
Tennessee	135	38	133	26	8	10	2	221	0	38
Vermont	1			65	0		15	22	0	0

October 1939

	Cases
Botulism:	
New York	1
Chickenpox:	
Alabama	12
Arizona	19
Colorado	90
Idaho	45
Kentucky	112
Maryland	93
Minnesota	236
Nebraska	12
New Mexico	26
New York	721
Pennsylvania	1,216
South Dakota	28
Tennessee	39
Vermont	141
Diarrhea:	
Maryland	32
New Mexico	3
Dysentery:	
Alabama (amoebic)	3
Arizona	97
Colorado (bacillary)	3
Kentucky (amoebic)	1
Kentucky (bacillary)	17
Maryland (bacillary)	31
Maryland (unspecified)	14
Minnesota (amoebic)	3
Minnesota (bacillary)	1
New Mexico (amoebic)	3
New Mexico (bacillary)	14
New York (amoebic)	6
New York (bacillary)	92
Pennsylvania (bacillary)	5
Tennessee (amoebic)	1
Tennessee (bacillary)	13
Encephalitis, epidemic or lethargic:	
Alabama	4
Arizona	11
Colorado	7
Maryland	1
Minnesota	1
New Mexico	2
New York	10
Pennsylvania	2
Tennessee	1
German measles:	
Alabama	1
Arizona	1

October 1939—Continued

	Cases
German measles—Con.	
Idaho	3
Kentucky	1
New Mexico	1
New York	49
Pennsylvania	82
Tennessee	3
Hookworm disease:	
Kentucky	8
Tennessee	2
Impetigo contagiosa:	
Maryland	34
Tennessee	15
Leprosy:	
Minnesota	1
New Mexico	1
Mumps:	
Alabama	27
Arizona	26
Colorado	29
Idaho	2
Kentucky	27
Maryland	13
Nebraska	11
New Mexico	13
Pennsylvania	325
South Dakota	8
Tennessee	19
Vermont	14
Ophthalmia neonatorum:	
Maryland	1
New York [1]	8
Pennsylvania	4
Tennessee	4
Puerperal septicemia:	
New Mexico	1
Tennessee	3
Rabies in animals:	
Alabama	11
New Mexico	1
New York [1]	19
Rocky Mountain spotted fever:	
Maryland	1
Septic sore throat:	
Colorado	4
Idaho	1
Kentucky	45
Maryland	12
Minnesota	14
Nebraska	3
New Mexico	13

October 1939—Continued

	Cases
Septic sore throat—Con.	
New York	52
Tennessee	13
Tetanus:	
Alabama	5
Kentucky	3
New York	7
Trachoma:	
Arizona	62
Trichinosis:	
New York	8
Tularaemia:	
Maryland	1
Minnesota	3
New Mexico	2
Tennessee	1
Typhus fever:	
Alabama	44
New York	2
Tennessee	36
Undulant fever:	
Alabama	4
Arizona	2
Colorado	1
Idaho	1
Kentucky	2
Maryland	3
Minnesota	6
New Mexico	2
New York	18
Pennsylvania	5
Tennessee	5
Vermont	1
Vincent's infection:	
Kentucky	7
Maryland	12
New York [1]	30
South Dakota	1
Tennessee	8
Whooping cough:	
Alabama	116
Arizona	42
Colorado	37
Idaho	8
Kentucky	187
Maryland	173
Minnesota	252
Nebraska	14
New Mexico	78
New York	1,122
Pennsylvania	1,116
South Dakota	13
Tennessee	142
Vermont	138

[1] Exclusive of New York City.

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WEEKLY REPORTS FROM CITIES

City reports for week ended November 11, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	239	110	33	507	503	1,036	6	333	38	1,013	--------
Current week[1]	125	84	33	283	326	681	0	272	51	771	--------
Maine:											
Portland	0	--------	0	2	1	0	0	1	0	11	26
New Hampshire:											
Concord	0	--------	0	0	0	0	0	0	0	0	8
Manchester	0	--------	0	0	0	0	0	0	0	0	14
Nashua	0	--------	0	0	0	0	0	0	0	0	8
Vermont:											
Barre	0	--------	0	0	0	0	0	0	0	0	2
Burlington	0	--------	0	0	0	0	0	0	0	3	11
Rutland	0	--------	0	0	0	0	0	0	0	0	11
Massachusetts:											
Boston	1	--------	0	8	6	19	0	4	0	40	174
Fall River	1	--------	0	0	0	0	0	0	0	12	30
Springfield	0	--------	0	1	1	0	0	0	0	8	29
Worcester	1	--------	0	2	2	0	0	1	0	10	44
Rhode Island:											
Pawtucket	0	--------	0	0	0	1	0	0	0	0	14
Providence	0	1	1	33	1	5	0	3	1	20	53
Connecticut:											
Bridgeport	0	--------	0	1	0	1	0	0	0	1	21
Hartford	0	--------	0	1	0	1	0	1	0	34	39
New Haven	0	--------	0	0	1	2	0	0	0	2	33
New York:											
Buffalo	0	--------	1	5	7	12	0	4	0	0	116
New York	16	7	1	7	49	45	0	53	10	107	1,356
Rochester	0	1	0	0	6	2	0	1	0	12	74
Syracuse	0	--------	0	0	2	1	0	0	0	2	35
New Jersey:											
Camden	0	--------	0	0	1	4	0	1	0	2	23
Newark	1	1	0	2	3	8	0	1	0	22	95
Trenton	0	1	0	0	3	3	0	1	0	2	39
Pennsylvania:											
Philadelphia	1	4	2	2	19	33	0	21	3	54	430
Pittsburgh	4	2	2	1	10	32	0	7	0	8	168
Reading	2	--------	0	0	0	1	0	1	0	2	30
Scranton	1	--------	--------	1	--------	1	0	--------	0	0	--------
Ohio:											
Cincinnati	10	--------	0	1	7	10	0	4	0	7	128
Cleveland	0	13	0	4	9	33	0	8	1	43	157
Columbus	10	2	2	1	5	2	0	2	0	0	84
Toledo	1	1	0	6	3	10	0	4	1	7	68
Indiana:											
Anderson	0	--------	0	0	0	3	0	0	0	2	8
Fort Wayne	1	--------	0	0	1	3	0	0	0	3	30
Indianapolis	3	--------	3	6	6	19	0	2	0	15	100
South Bend	0	--------	0	0	0	0	0	0	0	1	17
Terre Haute	0	--------	0	0	1	2	0	0	0	0	17
Illinois:											
Alton	0	--------	0	0	0	1	0	0	0	0	8
Chicago	7	6	2	9	35	87	0	27	0	59	669
Elgin	0	--------	0	0	1	2	0	0	0	1	16
Moline	0	--------	0	0	0	4	0	0	0	0	5
Springfield	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Michigan:											
Detroit	4	--------	0	3	7	72	0	10	0	27	210
Flint	0	--------	0	0	2	5	0	0	0	8	31
Grand Rapids	0	--------	0	2	0	11	0	0	0	0	27
Wisconsin:											
Kenosha	0	--------	0	0	0	3	0	0	0	2	3
Milwaukee	0	--------	0	2	1	25	0	4	0	23	89
Racine	0	--------	0	0	0	1	0	0	0	0	20
Superior	0	--------	0	0	0	3	0	0	0	0	14
Minnesota:											
Duluth	0	--------	0	6	1	1	0	0	0	0	19
Minneapolis	1	--------	1	6	7	22	0	2	0	10	107
St. Paul	0	--------	0	0	3	15	0	2	0	34	58

[1] Figures for Springfield, Ill., and Fargo estimated; reports not received.

City reports for week ended November 11, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0			2		1	0		0	2	
Davenport	2			1		7	0		0	0	
Des Moines	0		0	0	0	13	3	0	0	0	21
Sioux City	0			0		6	0		0	0	
Waterloo	0			0		5	0		0	0	
Missouri:											
Kansas City	0		1	3	3	10	0	4	1	0	89
St. Joseph	0		0	0	0	1	0	0	0	0	21
St. Louis	0		0	2	7	16	0	3	1	6	186
North Dakota:											
Fargo											
Grand Forks	0			2		1	0		0	0	
Minot	0		0	0	0	1	0	0	0	0	8
South Dakota:											
Aberdeen	0			0		5	0		0	0	
Sioux Falls	0		0	0	0	5	0	0	0	0	6
Nebraska:											
Lincoln	1			0		1	0		0	0	
Omaha	0		0	0	2	1	0	2	0	0	54
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	1
Topeka	0		0	1	0	10	0	0	0	0	5
Wichita	0	1	0	11	2	1	0	0	0	1	28
Delaware:											
Wilmington	0		0	0	4	3	0	1	0	9	25
Maryland:											
Baltimore	3	4	0	2	11	1	0	9	1	35	221
Cumberland	0	1	1	0	0	4	0	0	0	0	9
Frederick	0		0	0	0	1	0	0	0	0	3
Dist. of Col.:											
Washington	5	2	2	0	9	14	0	12	4	7	166
Virginia:											
Lynchburg	3		0	0	1	2	0	1	0	3	14
Norfolk	0	1	0	0	1	1	0	1	1	1	24
Richmond	1		0	0	6	7	0	2	2	1	55
Roanoke	0		0	1	0	1	0	0	0	0	16
West Virginia:											
Charleston	0	1	0	0	5	2	0	0	1	0	25
Huntington	2			0		0	0		0	0	
Wheeling	0	1	0	1	0	5	0	0	2	0	10
North Carolina:											
Gastonia	0			0		1	0		1	0	
Raleigh	3		0	1	0	5	0	1	0	0	6
Wilmington	1		0	0	0	0	0	1	0	0	16
Winston-Salem	8		0	1	0	5	0	0	0	1	5
South Carolina:											
Charleston	2	12	0	0	0	2	0	2	2	0	22
Florence	5	13	0	2	1	3	0	0	0	2	8
Greenville	2		0	0	0	0	0	0	0	0	7
Georgia:											
Atlanta	4	7	1	1	6	6	0	5	0	0	69
Brunswick	0		0	0	1	0	0	0	0	4	7
Savannah	1		0	0	1	1	0	1	0	2	29
Florida:											
Miami	0		0	0	1	2	0	3	0	0	31
Tampa	1	1	1	0	1	1	0	0	1	3	24
Kentucky:											
Ashland	1		0	0	0	0	0	0	0	0	4
Covington	1		0	1	1	2	0	1	0	1	16
Lexington	0		0	0	0	1	0	0	0	0	16
Louisville	1	1	0	0	6	4	0	0	0	43	71
Tennessee:											
Knoxville	0		0	0	1	10	0	0	0	0	27
Memphis	0		0	0	2	9	0	3	0	13	62
Nashville	0		1	0	5	5	0	3	0	1	
Alabama:											
Birmingham	0	4	2	0	3	2	0	4	0	0	62
Mobile	1		0	3	1	5	0	1	0	0	22
Arkansas:											
Fort Smith	0	2		0		2	0		0	0	
Little Rock	0		0	0	2	1	0	0	0	0	
Louisiana:											
Lake Charles	0		0	0	1	0	0	0	1	0	10
New Orleans	0	3	4	0	13	6	0	9	0	18	123
Shreveport	0		0	0	5	0	0	3	0	0	86

City reports for week ended November 11, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Oklahoma:											
Oklahoma City	0	2	0	0	1	1	0	1	0	0	34
Tulsa	1	-------	-------	0	-------	1	0	-------	0	1	-------
Texas:											
Dallas	5	1	1	0	5	4	0	4	0	1	74
Forth Worth	0	-------	0	0	1	3	0	0	0	2	36
Galveston	2	-------	0	0	1	1	0	1	0	0	16
Houston	4	-------	0	0	2	3	0	3	0	0	74
San Antonio	0	-------	1	4	2	1	0	7	1	0	54
Montana:											
Billings	0	2	0	0	0	2	0	0	0	0	5
Great Falls	0	-------	0	1	0	3	0	0	0	1	4
Helena	0	-------	0	0	0	0	0	0	0	0	7
Missoula	0	-------	0	0	0	0	0	0	0	0	9
Idaho:											
Boise	0	-------	0	0	0	0	0	0	0	0	4
Colorado:											
Colorado Springs	0	-------	0	0	2	1	0	4	0	0	13
Denver	6	-------	0	3	2	4	0	2	0	5	74
Pueblo	0	-------	0	0	1	0	0	0	0	0	8
New Mexico:											
Albuquerque	0	-------	0	1	1	0	0	1	0	0	12
Utah:											
Salt Lake City	0	-------	0	16	2	7	0	1	0	49	34
Washington:											
Seattle	1	-------	0	12	2	3	0	6	0	1	83
Spokane	0	-------	0	1	0	8	0	0	0	0	17
Tacoma	1	-------	0	102	0	4	0	0	0	0	24
Oregon:											
Portland	0	-------	0	3	4	7	0	2	0	4	69
Salem	0	-------	-------	1	-------	0	0	-------	0	0	-------
California:											
Los Angeles	7	4	3	8	8	25	0	10	20	11	311
Sacramento	2	1	0	1	2	2	0	2	0	0	34
San Francisco	1	1	0	3	10	4	0	8	0	6	141

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
Massachusetts:			
Fall River	0	1	0
New York:			
Buffalo	0	0	2
New York	2	0	1
Rochester	0	0	8
New Jersey:			
Trenton	0	0	1
Pennsylvania:			
Philadelphia	0	0	4
Pittsburgh	0	0	8
Ohio:			
Cincinnati	0	0	1
Cleveland	0	0	2
Illinois:			
Chicago	1	0	2
Michigan:			
Detroit	0	0	3
Wisconsin:			
Milwaukee	1	0	0
Minnesota:			
Minneapolis	0	0	2
St. Paul	1	1	2

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
Iowa:			
Des Moines	0	0	10
District of Columbia:			
Washington	1	0	0
South Carolina:			
Charleston	0	0	1
Georgia:			
Savannah	0	0	1
Kentucky:			
Ashland	0	0	1
Louisiana:			
New Orleans	1	0	0
Oklahoma:			
Oklahoma City	0	0	1
Utah:			
Salt Lake City	0	0	3
California:			
Sacramento	0	0	2
San Francisco	1	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1.

Pellagra.—Cases: Boston, 1; Wilmington, N. C., 2; Charleston, S. C., 1; Savannah, 1; Miami, 1; Birmingham, 1; Little Rock, 2.

Typhus fever.—Cases: New York, 2; Raleigh, 2; Charleston, S. C., 1; Atlanta, 3; Savannah, 2; Miami, 1; Nashville, 8; Mobile, 2; Fort Worth, 2; Houston, 2; Los Angeles, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 4, 1939.—During the week ended November 4, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	1	2					4
Chickenpox		21		104	205	51	70	67	104	622
Diphtheria		1	1	54	8	7	13	3		82
Dysentery					1				1	2
Influenza		21			55				6	82
Measles		4		86	110	31	2	2	24	259
Mumps		1		22	68	4		4	4	103
Pneumonia		8			19	3	1		5	36
Poliomyelitis		1		2	6		1			10
Scarlet fever		13	8	88	157	32	9	18	17	342
Trachoma							2		1	3
Tuberculosis		10	11	47	45	52	6	1		172
Typhoid and paratyphoid fever			5	11	8	1	5	1	2	33
Whooping cough		25		102	53	22	15	16	8	241

NOTE.—No cases of the above diseases were reported from Prince Edward Island for this period.

JAMAICA

Communicable diseases—4 weeks ended October 28, 1939.—During the 4 weeks ended October 28, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox		5	Leprosy		2
Diphtheria	3	2	Tuberculosis	39	89
Dysentery	1	2	Typhoid fever	9	58

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of November 24, 1939, pages 2106–2119. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Tsingtao.—During the period September 3 to October 14, 1939, 122 cases of cholera with 93 deaths were reported in Tsingtao, China.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District.—Four rats found on October 19, 1939, in Hamakua Mill Area, 1 rat found on October 18, and 1 rat found on October 26, 1939, in Paauhau Sector, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Typhus Fever

Straits Settlements—Singapore.—During the week ended September 16, 1939, 1 case of typhus fever was reported in Singapore, Straits Settlements.

Yellow Fever

Nigeria.—Yellow fever has been reported in Nigeria as follows: Jos, 1 suspected case on November 7; Odochin, 1 case on November 4, 1939.

Niger Territory—Dosso.—On November 5, 1939, 2 suspected cases of yellow fever were reported in Dosso, Niger Territory.

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Public Health Reports

VOLUME 54 DECEMBER 8, 1939 NUMBER 49

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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COMPARISON OF OCCUPATIONAL CLASS AND PHYSICIANS' ESTIMATE OF ECONOMIC STATUS [1]

By JENNIE C. GODDARD, *Assistant Statistician, United States Public Health Service*

In the absence of a more exact measure of economic status, occupational class is at times utilized as a rough index of differences in ability to purchase goods and services. Occupations as reported on birth and death certificates have generally been found to lack the specificity necessary for classification in any great detail but have often been employed to differentiate a few general classes. Occupation of the father, as recorded on birth certificates, and economic status of the family, as reported by attending physicians in a special survey, are available for approximately 10,000 families from data collected for a study of maternal care in Michigan.[2] Comparison of these families according to occupational class of the head and physicians' estimate of economic status gives some indication as to the extent to which occupational class may be used to differentiate families with respect to social-economic level.

The population of the maternal-care study was defined by the birth certificates registered with the Michigan State Department of Health for all legitimate live births and stillbirths occurring during the first quarter of 1936. For each maternal case the signer of the certificate was requested to record an obstetric history questionnaire, which also inquired into the family's economic status (in qualitative terms—comfortable, moderate, poor) and whether the family had received financial aid in the form of relief. There were 21,568 births; obstetric histories were returned for 10,585 maternal cases or 49 percent of the total. The discussion based on the physicians' estimate of economic status is necessarily limited to consideration of those families for which obstetric histories were returned. Of the histories returned, 97 percent were reported by doctors of medicine, 2 percent by doctors of osteopathy, and 1 percent by other and unspecified types of attendants (including midwives and nurses).

[1] From the Division of Public Health Methods, National Institute of Health.

[2] Maternal care in Michigan. A study of obstetric practices. National Health Survey, 1935-36, Preliminary Reports, Sickness and Medical Care Series, Bulletin No. 8. National Institute of Health, U. S. Public Health Service, 1938.

Maternal services in Michigan with special reference to economic status. By Jennie C. Goddard and Carroll E. Palmer. Pub. Health Rep., 54: 825 (May 29, 1939).

The groups of families under discussion are predominantly white. Only 4 percent of the families represented in the study of maternal care were colored. Similar proportions of colored were found in the two groups with which comparisons of findings are made, the families canvassed in 1935–36 in Michigan in connection with the National Health Survey and the employed males, 10 years and over, in Michigan, according to the 1930 Census.

The birth certificate used in Michigan in 1936 differed from the standard certificate with respect to the inquiry concerning the parents' occupational histories; the Michigan certificate requested only "occupation (and industry)." For the father, this item was converted into occupational class according to Edwards' social-economic classification.[3]

Certain combinations of Edwards' occupational classes were necessary because the returns lacked sufficient detail for differentiation. Farmers and farm owners were combined with farm laborers to form an agricultural group, since in many instances only "farm" was reported; and factory and building construction laborers were combined with other laborers to form a group of unskilled workers. For each occupational class the percentage distribution by economic status of the family is given in table 1. The corresponding number of families is shown in the appendix, table 1.

TABLE 1.—*Percentage distribution by economic status of 10,000 Michigan families according to occupational class of head (Michigan maternal care study, 1936)*

Occupational class	Comfortable	Moderate[1]	Poor[2]	Unknown	Total
All occupational classes	14.7	42.0	38.2	5.1	100.0
Professional persons	41.7	44.3	11.2	2.8	100.0
Wholesale and retail dealers	36.4	50.2	11.6	1.8	100.0
Other proprietors, managers, and officials	44.6	46.8	6.8	1.8	100.0
Clerks, salesmen, and kindred workers	23.8	52.9	18.5	4.9	100.0
Skilled workers and foremen	16.7	50.5	28.4	4.4	100.0
Semiskilled workers in manufacturing	10.3	49.1	31.8	8.8	100.0
Semiskilled workers not in manufacturing	8.8	50.9	36.1	4.1	100.0
Agricultural workers	14.9	40.8	39.6	4.7	100.0
Unskilled workers	5.5	28.7	61.1	4.8	100.0
Domestic service	5.6	31.1	58.9	4.4	100.0
Unknown	6.9	24.6	63.7	4.8	100.0

[1] Includes 26 families recorded as nonrelief but not specified as to economic status.
[2] All families receiving relief were assumed to be poor.

Little meaning can be attached to the agricultural group as a designation of social-economic status, particularly since the group includes owners and tenants of farms and the agricultural laborers. Because of sharp environmental differences, it has, however, usually been considered advantageous to separate the rural population in some way when studying specific problems among different population groups. The present position of the agricultural group among the

[3] Edwards, A. M.: A social-economic grouping of the gainful workers of the United States. U. S. Bureau of the Census, 1938.

occupational classes was assigned merely on the basis of the proportion of families recorded as poor.

It is evident that the classification of families according to the occupational class of the head gives definitely differentiated groups with respect to their economic status in terms of the physicians' estimate. According to the Michigan experience, however, little loss in the differentiation would result in combining (1) professional and business (professional persons, wholesale and retail dealers, and other proprietors, managers, and officials); (2) skilled and semiskilled workers; and (3) unskilled workers and those in domestic service. The percentage distributions according to the physicians' estimate of economic status are given for these combinations and for the clerical group in the left half of figure 1. Families for which the physicians' estimate was not available were excluded.

Both the physicians' estimate of the family's economic status and the occupational class of the head lack precision as a measure of the family's ability to purchase goods and services. From material collected during the National Health Survey, families comprising a sample of the general population of Michigan may be classified by the more precise measure of annual family income (1935–36) and by occupational class of the head.[4] The distributions of the families by the occupational class of the head from these two sources are not entirely comparable, although Edwards' classification was used for both studies. In the health survey, trained enumerators were instructed to record, in accordance with the census descriptions and definitions, the individual's usual occupation or the one at which he had worked longest. Another limitation is imposed on the comparability of the distributions by the fact that the maternal care study included only those families in which births occurred during one quarter of the year, whereas the health survey included all types of families. Despite these limitations, it seems worth while to compare the percentage distributions of the grouped occupational classes in the two studies according to their respective measures of economic status. These distributions are given in figure 1, families unrecorded as to physicians' estimate and annual family income being excluded. The health survey sample for five cities and two rural areas was adjusted by size of city of residence to the distribution of the maternal care study.

The distribution of health survey families by annual family income shows a close association with the classification by occupational class of the head. Moreover, within any given occupational class the relation of annual family income for health survey families to the occupa-

[4] Unpublished data from the National Health Survey, 1935–36, a house-to-house enumeration of the prevalence and incidence of disabling illness and the receipt of medical care in relation to income, occupation, and other factors among some 800,000 families in 19 States. National Institute of Health, U. S. Public Health Service.

tional class of the head is similar to that of the physicians' estimate of economic status for the maternal care study families. These findings give further substantiation of the conclusion that occupational class of the head is a usable classifying item in differentiating families according to social-economic status.

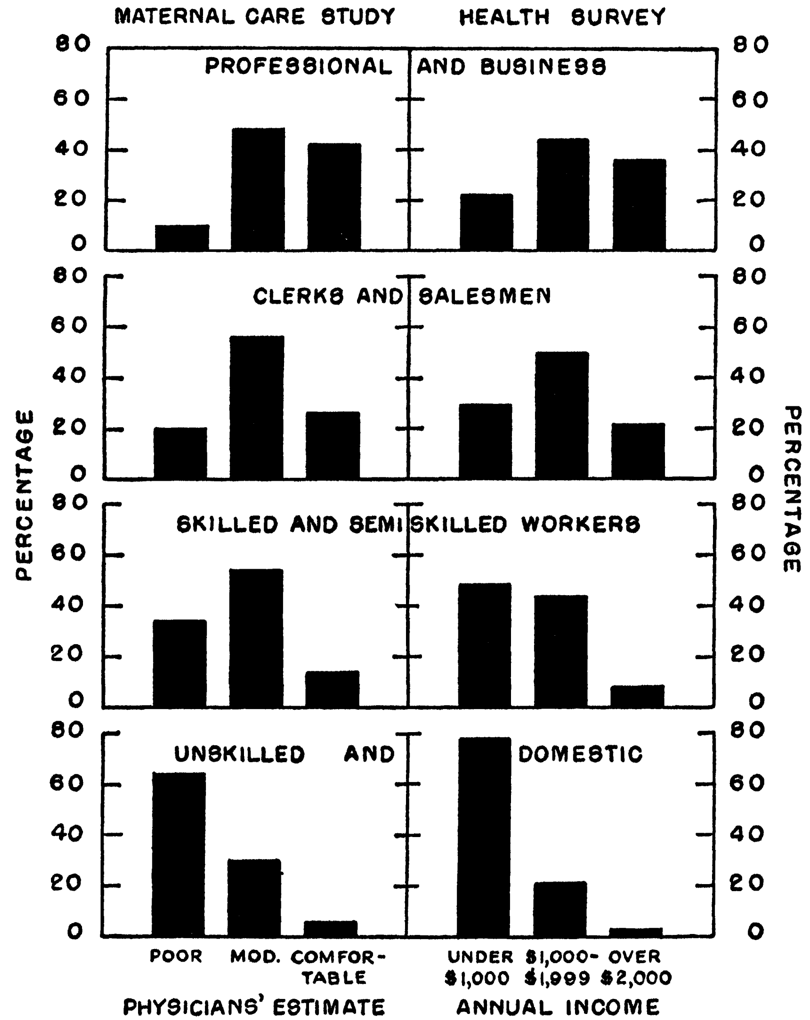

FIGURE 1.—Percentage distribution by physicians' estimate of economic status and by annual family income of families included in maternal care study and in health survey (Michigan), respectively, for certain groups according to occupational class of head.

Receipt of financial aid in the form of relief is important in selecting a group of families of definitely limited financial resources. In table 2 and figure 2 are shown the percentage of the maternal care study families in the individual occupational classes (exclusive of the

TABLE 2.—*Percentage of families receiving relief, according to occupational class of head (Michigan maternal care study, 1936)*

Occupational class	Percentage of families receiving relief	Number of families	
		Receiving relief	With record as to relief status
All occupational classes [1]	14.1	1,344	9,544
Professional persons	4.6	19	411
Wholesale and retail dealers	2.8	9	319
Other proprietors, managers, and officials	1.5	4	271
Clerks, salesmen, and kindred workers	3.3	34	1,015
Skilled workers and foremen	8.0	118	1,470
Semiskilled workers in manufacturing	5.6	89	1,576
Semiskilled workers not in manufacturing	8.7	47	539
Agricultural workers	14.2	165	1,164
Unskilled workers	31.5	669	2,124
Unknown	31.4	183	582

[1] Includes 73 families, 7 receiving relief, with heads employed in domestic service.

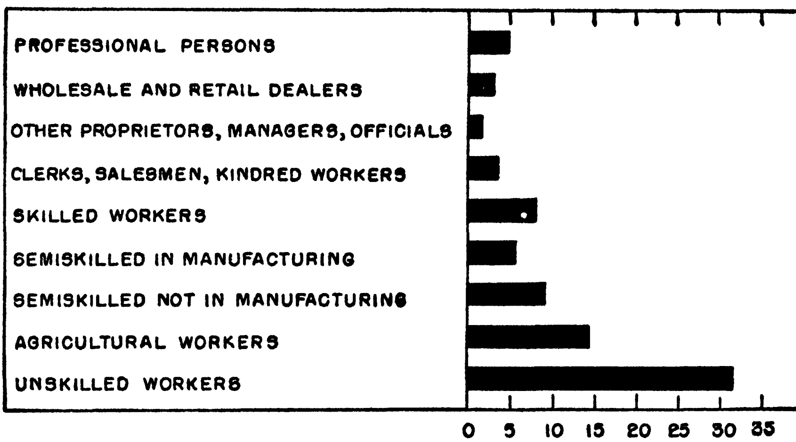

FIGURE 2.—Percentage of families receiving relief according to occupational class of the head of the family.

domestic service group, in which the number of families was small) recorded as receiving relief.[5]

The proportion of families on relief in general tended to increase as social-economic level declined. The proportion among the proprietors, managers, and officials, other than dealers, who were on relief was, however, significantly lower than among the professional persons or the average for the professional and business group. The clerical group received relief with the same frequency as the professional and business group. Although the proportion of the skilled and semiskilled group receiving relief was considerably higher than that of the professional and business or clerical group, the rate for skilled workers was significantly higher than for semiskilled workers in manufacturing and as high as for other semiskilled workers.

[5] Since the inquiry regarding relief did not specify the period to be considered, families on relief at some time during the pregnancy but not at the time of confinement or during the attendant's supervision may not be included in the relief group.

Numerous comparisons of occupational returns on birth and death certificates with those recorded during the decennial census have previously indicated that returns from these sources vary considerably by occupation and, to a less extent, by occupational class. It is of interest to review the distributions by occupational class of the heads of families in the maternal care study and of employed males in Michigan, 10 years of age and over, from the 1930 census.[6] These distributions are given in table 3.

In comparing the above distributions, it should be kept in mind that the two groups are not identical with respect to age and marital status and that the maternal care study was made 6 years after the census enumeration. Moreover, previous investigations have shown that fertility rates vary inversely with social-economic status.

TABLE 3.—*Number and percentage distribution by occupational class of heads of families in maternal care study, 1936, and of employed males, 10 years of age and over, in Michigan in 1930*

Occupational class	Percentage distribution		Number	
	Families in maternal care study	Employed males, 10 years and over	Families in maternal care study	Employed males, 10 years and over
All occupational classes	100.0	[1] 100.0	10,585	[1] 1,545,416
Professional persons	4.0	3.7	427	57,346
Wholesale and retail dealers	3.1	4.0	327	61,395
Other proprietors, managers, and officials	2.6	4.4	278	67,497
Clerks, salesmen, and kindred workers	10.2	12.4	1,084	192,266
Skilled workers and foremen	14.8	22.8	1,567	351,646
Semiskilled workers	22.2	19.0	2,353	293,471
Agricultural workers	12.1	[1] 14.1	1,281	[1] 217,495
Unskilled workers	22.8	17.4	2,409	268,930
Domestic service	.9	2.3	90	35,370
Unknown	7.3	------------	769	------------

[1] Exclusive of 22,109 unpaid family workers on farms.

SUMMARY

The data collected during a study of maternal care in Michigan provided the opportunity to make a comparison for 10,000 families of the distribution by occupational class of the head, derived from birth certificates, against that by economic status of the family, as reported by the person signing the birth certificate. Ninety-seven percent of the certificates were signed by attending physicians. This comparison indicates that classification of families according to occupational class of the head gives definitely differentiated groups with respect to their economic status in terms of the physicians' estimate. Similar results are obtained when families in the general population in Michigan are compared according to annual family income and occupational class of head. In the absence of a more exact measure of ability to purchase goods and services, therefore, occupational class of the head seems to be a useful index of the family's social-economic status.

[6] See footnote 3.

Appendix

TABLE 1.—*Number of families classified by physicians' estimate of economic status of family and occupational class of head (Michigan maternal care study, 1936)*

Occupational class	Nonrelief			Relief	Unknown for relief		Poor or relief	Total
	Comfortable	Moderate [1]	Poor		Poor	Unknown economic status		
All occupational classes	1,556	4,444	2,200	1,344	500	541	4,044	10,585
Professional persons	178	189	25	19	4	12	48	427
Wholesale and retail dealers	119	164	27	9	2	6	38	327
Other proprietors, managers, and officials	124	130	13	4	2	5	19	278
Clerks, salesmen, and kindred workers	258	573	150	34	16	53	200	1,084
Skilled workers and foremen	262	791	299	118	28	69	445	1,567
Semiskilled workers in manufacturing	183	870	434	89	40	156	563	1,772
Semiskilled workers not in manufacturing	51	296	145	47	18	24	210	581
Agricultural workers	191	523	285	165	57	60	507	1,281
Unskilled workers	132	691	632	669	170	115	1,471	2,409
Domestic service	5	28	33	7	13	4	53	90
Unknown	53	189	157	183	150	37	490	769

[1] Includes 26 families recorded as nonrelief but not specified as to economic status.

EFFECT OF FLUORIDES ON SALIVARY AMYLASE [1]

By F. J. McClure, *Associate Pharmacologist, United States Public Health Service*

Amylolytic enzymes have been reported to be more active in the presence of fluorides (*1, 2, 3*), to remain unaffected by fluorides (*4, 5, 6, 7*), or to be inhibited in their reactions (*5, 6, 8, 9, 10*). According to Clifford (*5, 6*), the fluorides, KF and NH_4F, were found to cause a marked inhibition of pancreatic and salivary amylase, whereas NaF was inert, up to a concentration of 0.5 M. The contradiction in the results cited above appears to be due to a failure to maintain certain optimum conditions as regards pH and activating electrolyte, known to be required for normal amylolytic enzyme action. The work of Sörensen (*11*), Myrbäck (*12*), and Sherman, Thomas and Baldwin (*13*) demonstrated the extreme sensitivity of amylolytic reactions to slight variations in pH. The optimum pH for salivary amylase in the presence of chloride activation is about pH 6.7. A change to pH 6.0 or 7.5, for example, may inhibit the activity of amylase as much as 25 percent (*12*).

Sherman, Caldwell, and Adams (*14, 15*), studied the optimum pH at which various electrolytes activate salt-free pancreatic amylase. NaF activates salt-free amylase up to 24 percent of the total activation produced by sodium chloride, the optimum pH for 0.10 M, 0.20 M, and 0.30 M NaF activation being 6.3–6.7, 6.6–6.8, and 6.6–6.8,

[1] From the Division of Infectious Diseases, National Institute of Health.

respectively. Myrbäck (*12*) worked with purified amylase also. In the presence of 0.0015 N NaCl he found that 0.03 N KF was without effect on amylolytic action.

The results presented in this paper give no indication of an effect on salivary amylase of quantities of NaF, KF, NH_4F, and Na_2SiF_6 which are undoubtedly physiologically excessive and which are greater than any quantities of fluoride actually encountered under conditions of chronic endemic fluorosis (*16*). A reaction pH of approximately 6.6 was maintained by means of a phosphate buffer, and activation of the enzyme was assured by adding sodium chloride to the substrate prior to testing the effect of fluoride.

The procedure for determining amylolytic activity was as follows: A soluble starch substrate was prepared consisting of 25 cc. of a 1 percent solution of soluble starch (Mallinckrodt's soluble starch was used, the solution being boiled for 3 minutes), 1 cc. of a KH_2PO_4–Na_2HPO_4 buffer (pH 6.6), and 1 cc. of a 1 percent solution of sodium chloride. The volume was made up to 50 cc. in a 50-cc. glass stoppered digestion cylinder and brought to a temperature of 37.5° C. in a constant temperature oven. One cubic centimeter of a 1 to 10 dilution of stimulated saliva was added and the reaction allowed to proceed for exactly one-half hour at 37.5° C. The reaction was stopped by adding 2 cc. of normal HCl, and the contents of the digestion cylinder transferred to an Erlenmeyer flask. The acid was just neutralized with dilute alkali. Total reducing sugars were then determined by titration with standard iodine and thiosulfate, following the procedure recommended by Kline and Acree (*17*). The results are recorded as milligrams of maltose produced.

Two methods for testing the possible effects of fluoride were followed. In one (table 1) the saliva was diluted 1 to 10 with the various fluoride solutions and allowed to stand 1 hour in the cold before measuring enzyme activity, and in the other (table 2), the fluoride solutions were added to the substrate directly, before adding 1.0 cc. of a 1 to 10 water-dilution of saliva. The data presented in table 1 show that concentrations of fluorides varying from 1.7 to 8,550.0 p. p. m. of fluorine in the diluted salivas were without effect on the subsequent activity of the enzyme. Where NH_4F and Na_2SiF_6 were present in high concentrations (table 1) the reactions were not properly buffered by 1 cc. of the usual phosphate buffer (pH 6.6). Inhibition of enzyme activity in these cases is due to a modified pH, but by proper buffering these fluoride salts also may be shown to be innocuous at these levels (table 1).

TABLE 1.—*Effect of fluorides on salivary amylase. Saliva diluted 1 to 10 with fluoride solutions and allowed to stand 1 hour in cold before testing enzyme activity*

Fluoride	F in diluted saliva (p. p. m.)	F present during reaction (p. p. m.)	pH of reaction		Reducing sugars calculated as maltose (mg.)		Enzyme activity compared as per cent of control	
Saliva sample			F.J.M.	W.S.M.	F.J.M.	W.S.M.	F.J.M.	W.S.M.
Control	0.0	0.0	6.5	6.6	107 8	99.6	100 0	100 0
NaF	8550.0	171.0	6.6		109.1	99.2	101.2	100.4
Do	1710 0	34.2			108 3	101 3	100 5	101.7
Do	171.0	3.4			105.8	102.9	98.1	103.3
Do	17.1	.3			102.9	99.4	95 5	99.8
Do	1.7	.03			105.5	100.4	97.9	100.8
Control	0 0	0.0	6.6	6.6	114.4	94 9	100 0	100.0
KF	8550 0	171.0	6.6		115.6	94.8	101 0	99.9
Do	1710.0	34.2			110.1	96 9	96 2	102.1
Do	171 0	3.4			113 3	97 4	99 0	102.6
Do	17.1	.3			110.5	96.8	96.6	102.0
Do	1.7	.03			112.0	96.7	97.9	101.8
Control	0 0	0.0	6.6	6.6	106 8	93.5	100.0	100.0
NH_4F	8550 0	171.0	5.8	5.6	94.5	53 8	88.5	57.5
Do	1710.0	34 2		6.4	108.3	93 9	101.4	100 4
Do	171.0	3.4			104.5	97.7	97.8	104.4
Do	17.1	.3			104.6	96.8	97.9	103.5
Do	1.7	.03			101.8	95.2	95.3	101.8
Control	0.0	0 0	6.6	6.6	105.5	92.9	100.0	100.0
Na_2SiF_6	8550.0	171.0	3.7	3.6	12 2	12.9	11.6	13.9
Do	1710.0	34.2	3.8	3.8	16.7	17.0	15.8	18.3
Do	171 0	3.4		6.3	103.7	91.9	98 3	98.9
Do	17.1	.3			104.8	92.5	99.3	99.5
Do	1.7	.03			108 2	92.2	102.5	99.2
Control	0 0	0.0	6.6	6 8	97 0	96.6	100.0	100.0
Na_2SiF_6	8550 0	171 0	6.5	6.9	92.6	95.7	95 4	95.9
Do	1710.0	34 2	6.6	7.0	98.2	94.1	101 2	94.1
NH_4F	8550.0	171.0	6.5		104.1	99.0	107.3	102.4

TABLE 2.—*Effect of fluorides on salivary amylase. Fluorides present during enzyme-substrate reaction*

Fluoride	F present during reaction (p. p. m.)	pH of reaction		Reducing sugars calculated as maltose (mg.)		Enzyme activity compared as per cent of control	
Saliva sample		F. J. M.	W. S. M.	F. J. M.	W. S. M.	F. J. M.	W. S. M.
Control	0.0	6.6	6.6	104.7	101.3	100.0	100.0
NaF	3,800 0	6.5		94.7	87.6	90.4	86.5
Do	760.0	6.5	6.4	103.5	95.6	98.9	94.4
Do	76.0	6.6	6.6	97.9	99.4	90.9	98.1
Do	7.6	6.6	6.6	107.8	100.8	100.1	99.5
Do	.76	6.6	6.6	103.7	97.4	96.3	96.2
Control	0.0	6.6	6.6	112.4	99.2	100.0	100.0
KF	3,800 0		6.9	96.8	100.5	86.1	101.3
Do	760.0		6.4	104.2	94.9	92.7	95.6
Do	76.0		6.5	109.9	97.6	97.8	98.3
Do	7.6			110.8	98.7	98.6	99.4
Do	.76			111.2	95.5	98.9	96.2
Control	0.0	6.6	6.6	110.3	99.9	100.0	100.0
NH_4F	3,800.0	6.1		24.6	29.2	22.3	29.2
Do	760.0	5.4	5.5	46.3	35.9	42.0	35.9
Do	76.0	6.3		110.6	86.6	100.2	86.7
Do	7.6	6.6		111.3	98.1	100.9	98.2
Do	.76			112.9	100.3	102.3	100.4

TABLE 2.—*Effect of fluorides on salivary amylase. Fluorides present during enzyme-substrate reaction*—Continued

Fluoride	F present during reaction (p. p. m.)	pH of reaction		Reducing sugars calculated as maltose (mg.)		Enzyme activity compared as per cent of control	
Saliva sample		F. J. M.	W. S. M.	F. J. M.	W. S. M.	F. J. M.	W. S. M.
Control	0.0	6.6	6.0	108.3	96.9	100.0	100.0
Na_2SiF_6	3,800.0	3.7		0.0	0.0	0.0	0.0
Do	760.0	3.6	3.6	0.0	0.0	0.0	0.0
Do	76.0	3.6	3.6	18.3	15.3	16.9	15.8
Do	7.6	5.5		84.0	74.9	77.6	77.3
Do	.76	6.4		108.5	97.2	100.1	100.3
Control	0.0	6.6		110.1	96.8	100.0	100.0
Na_2SiF_6	760.0	6.5	6.2	102.8	84.4	93.4	87.2
Do	76.0	6.5		95.3	99.0	86.6	102.3
Do	7.6		6.8	102.8	96.8	93.4	100.0
Control	0.0	6.6		116.2	93.8	100.0	100.0
NH_4F	760.0	6.8		108.4	87.2	93.3	93.0

The results presented in table 2 show no effect of NaF, KF, NH_4F' and Na_2SiF_6 in concentrations equaling 0.76, 7.6, 76.0, and 760.0 parts per million of fluorine. Sodium fluoride and KF were inert up to concentrations equal to 3,800 parts per million of fluorine. The inhibition caused by NH_4F and Na_2SiF_6 at fluorine concentrations equaling 3,800 parts per million of fluorine was not investigated further, since such quantities are in great excess physiologically. Substrates containing Na_2SiF_6 in concentrations equaling 7.6, 76.0, and 760.0 parts per million of fluorine as well as substrates containing NH_4F in a concentration equal to 760 parts per million of fluorine required special buffering before normal amylolytic action was obtained.

EFFECTS OF FLUORIDES IN DRINKING WATER

The presence of fluorides in drinking water is the cause of endemic mottled enamel (*16*), and there may be other toxic effects resulting from the ingestion of fluorides. According to the enzyme studies presented above, unabsorbed fluorides in the drinking water will not affect the reaction of salivary amylase in the human system. However, there remained the possibility of a physiological effect of fluorides absorbed from drinking water and food on the salivary amylase as secreted. The following data throw light on this latter question.

In connection with a recent dental survey conducted by Dean et al. (*18*), saliva specimens from a group of school children whose drinking water contained on the average 1.8 parts per million of fluorine (Galesburg, Ill.) were available for determination of amylolytic activity. These specimens were compared with a number of other specimens collected under similar conditions from children whose drinking water contained no fluorine (Quincy, Ill.). The two groups of salivas were packed in ice and were received at the labora-

tory in Washington, D. C., at temperatures of 7° C. and 10° C., respectively. Amylase was determined according to the method outlined above, except that Merck's soluble starch, according to Lintner, was used instead of the Mallinckrodt product. Slightly more maltose resulted from the use of the Merck starch. A total of 63 specimens of saliva from children living in Quincy, Ill., averaged 105.9 ± 5.2 mg.[2] of maltose, as compared with an average of 108.7 ± 3.1 mg. of maltose for 82 specimens from children living in Galesburg, Ill. These results include all salivas from each group, although the individual data indicate that a number of salivas from each group may have deteriorated after the time of collection in spite of the low temperature maintained. Figures for total maltose, which were somewhat less than 90 mg., were thought to be evidence of a loss of amylolytic activity following collection of the saliva. This may or may not be the case. Only a limited number of data are available from which to determine what variations may occur normally among a group of individual salivas. Among the above data, 17.4 percent of the results obtained on the samples of saliva from Quincy showed less than 90 mg. of maltose, and 14.6 percent of the samples from Galesburg gave less than 90 mg. of maltose (table 3). An upper limit of 137 mg. of maltose was obtained in one saliva sample. The following table gives information regarding the general consistency of the data.

TABLE 3.—*Distribution of the saliva specimens by cities according to maltose producing activity expressed in milligrams*

Maltose (mg.)	Galesburg		Quincy	
	Number	Percent of total	Number	Percent of total
(45)-50	0	0.0	4	6.3
50-90	12	14.6	7	11.1
90-100	5	6.1	6	9.5
100-110	16	19.5	11	17.5
110-120	27	32.9	22	34.9
120-130	16	19.5	7	11.1
130-(137)	6	7.3	6	9.5
	82		63	

The means of these distributions, i. e., 105.9 ± 5.2 mg. for Quincy and 108.7 ± 3.1 mg. for Galesburg, show no statistically significant differences. It may be said with reasonable assurance that fluoride ingestion, brought about by the use of a domestic water supply containing approximately 1.8 parts per million of fluorine, does not

[2] The following formula was used to compute the probable error of the mean:

$$P.\ Em. = .6745\sqrt{\frac{\Sigma d_2}{N\ (N-1)}}$$

P. Em. = probable error of mean.

Σd_2 = sum of the squared individual deviation from the mean.

N = total number of samples in the series.

change the final amylolytic activity of the saliva secreted under these conditions.

CONCLUSIONS

The fluorides, NaF, KF, NH_4F, and Na_2SiF_6, were found to have no effect on the activity of salivary amylase in concentrations varying from 1.7 to 8,550 parts per million of fluorine present in 1 to 10 dilutions of salivas which stood for 1 hour in the cold prior to testing amylolytic property. The same fluorides, when present in the enzyme-substrate mixture during the digestion period, in concentrations varying from 0.76 to 760 parts per million of fluorine in the substrate, had no final effect on enzyme activity. The salivas of school children whose drinking water contained an average of 1.8 parts per million of fluorine showed no differences in amylolytic action from a similar group of salivas obtained under similar conditions from school children whose drinking water was free from fluoride.

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THE CULTIVATION OF *RICKETTSIA DIAPORICA* IN TISSUE CULTURE AND IN THE TISSUES OF DEVELOPING CHICK EMBRYOS*

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In a previous publication (*1*) it was stated that the filterable infectious agent isolated from *Dermacentor andersoni* and now called *Rickettsia diaporica* (*2*) could be readily cultivated and maintained serially in modified Maitland tissue cultures.

In the present paper observations are presented of the growth of this organism in modified Maitland cultures and in the tissues of the developing chick embryo (*3*).

TECHNIQUE

Tissue cultures.—Numerous modifications of Tyrode's and Baker's (*4*) solutions [1] were tried. The best and most consistent results were obtained with filtered human ascitic fluid or Baker's solution containing 50 percent ascitic fluid. The tissues employed were minced yolk-sac, chorio-allantoic membrane, or the embryo proper from chick eggs incubated at 39.4° C. for 9 or 10 days. Fifty-cc. Erlenmeyer flasks containing approximately 4 cc. of suspension medium and 0.1 gram of minced tissue were used.

The original inoculum was 0.5 cc. of a Berkefeld N or W filtrate of the supernatant portion of a centrifuged (2,500 to 3,000 r. p. m. for 15 minutes) [2] 5-percent suspension of infected guinea pig spleen in Tyrode's solution. The culture flasks, either stoppered with rubber stoppers and sealed with paraffin or plugged with cotton and capped with tin foil, were incubated at 37° C. Subcultures were made at intervals of 8 to 14 days, the dilution factor being approximately 1 to 10 at each transfer (0.4 cc. of material from previous culture).

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[1] Various modifications of Tyrode's and Baker's solutions to which were added from 10 to 50 percent of horse, cow, guinea pig, rabbit, or chicken sera, as well as whey, chick amniotic fluid, chick embryo extract, and human amniotic or ascitic fluid were tried.

[2] A 51° angle centrifuge was used in all experiments.

Inoculation of developing chick embryos.—Eggs that had been incubated at 39.4° C. for 5 or 6 days were injected in the yolk by the technique previously described (*3*). The same inoculum was used as in the tissue culture series. The inoculated eggs were incubated at 35° C. and transfers made every 5 to 9 days by using 0.5 cc. of a 10-percent suspension of the yolk-sac in normal saline.

Titration tests of tissue cultures.—Several flask cultures of the same transfer were pooled and centrifuged (2,500 to 3,000 r. p. m. for 15 minutes) to throw down tissue fragments. The supernatant fluid was carefully pipetted off and saved. The cellular sediment was ground with sterile alundum to a homogeneous suspension and then resuspended in the supernatant fluid and again similarly centrifuged to throw down all gross particles and tissue debris. The supernatant fluid (undiluted culture material) was carefully pipetted off, diluted decimally with Tyrode's or with a mixture containing equal parts of Tyrode's and ascitic fluid, and each dilution was tested by injecting guinea pigs intraperitoneally or subcutaneously with 1 cc. each.

Titration tests of tissues of developing chicks.—The selected material (yolk-sac, chorio-allantois, or embryo proper) was removed aseptically from 3 or 4 eggs of the same transfer and washed once or twice with sterile saline to remove yolk or other fluid. The tissue material was then drained, pooled, weighed, and ground. The ground tissue was diluted with Tyrode's, or a mixture of Tyrode's and ascitic fluid, to make a 10-percent suspension and the latter centrifuged (2,500 to 3,000 r. p. m. for 15 minutes) to throw down tissue fragments. The supernatant fluid was then diluted and tested by animal inoculation in a manner similar to that used for the tissue cultures.

TISSUE CULTURE DATA

Five series of cultures (A, B, C, D, and E) were initiated and carried in the minced tissues of the chick embryo, two (F and G) in minced yolk-sac tissue and one (H) in minced chorio-allantoic tissue; ascitic fluid was the suspension medium. Series A was carried through 18 transfers, B through 14, C through 12, D, E, and F through 22 each, G through 38, and H through 18.

Multiplication of rickettsiae occurred in each series but the best and most consistent growth was obtained in cultures prepared with minced yolk-sac tissue.

Infectivity tests.—Repeated titration tests showed that yolk-sac cultures consistently reached a higher infective titer than did cultures prepared with minced embryo or chorio-allantois.

Thus, the limit of infectivity of yolk-sac cultures was, as a rule, 10^{-7} or 10^{-8} while cultures of chorio-allantois and embryo were generally 100 to 1,000 fold and occasionally even 10,000 or 100,000 fold less infectious. Only twice did cultures of minced embryo reach

a titer of 10^{-8}, while cultures of chorio-allantois reached a titer of 10^{-7} only once.

Presence of rickettsiae.—In cultures prepared from minced embryo or chorio-allantoic tissues, rickettsiae were never found until the third or fourth transfer. They first appeared in small numbers both extracellularly and intracellularly. As a rule further transfers showed rickettsiae present in increasing quantities. The greatest number of rickettsiae were found from the eighth to twelfth days and occasional cultures showed thousands of organisms in an oil-immersion field.

A few of the cultures prepared with minced embryo showed occasional well preserved cells containing rickettsiae in the cytoplasm. Individual bipolar rods or diplobacillary forms were found singly or diffusely distributed in small groups. Also small spherical clusters or nests of less discrete organisms were observed. The cytoplasm of some cells contained large oval vacuoles within which were large numbers of rickettsiae. In a few instances nuclei were observed which appeared to be vacuolated, and sharply stained forms, indistinguishable from the bipolar forms commonly observed, could be seen in the vacuoles. Thus the picture is similar to that observed in infected guinea pig tissues (*1*).

The yolk-sac series of cultures showed differences in that rickettsiae were found in the initial cultures and successive transfers usually showed rickettsiae present in numbers even greater than in the best of the embryo or chorio-allantois cultures. The greatest number were present on the eighth to twelfth day, at which time practically all were extracellular owing to the rapid disintegration of yolk-sac tissue. However, a certain number of fairly well preserved cells were found in smears prepared on the fourth to sixth days. These were cells that line the yolk-sac and possess a highly vacuolated cytoplasm. In them rickettsiae may be seen only in the anastomosing cytoplasmic strands which make up the major portion of the cell. Intranuclear rickettsiae were not observed in any of the yolk-sac cultures.

Other tissue culture experiments. Comparison of growth in cotton and rubber stoppered flasks.—An experiment was made to determine whether this rickettsia could be cultivated like a typical filterable virus, that is, in cotton stoppered flasks with transfers being made every 3 or 4 days. Four different culture combinations were tried, minced chick embryo or yolk-sac tissue suspended in ascitic fluid or in a modified Baker's solution containing 20 percent chicken serum. For comparison two series of cultures consisting of minced embryo or yolk-sac suspended in ascitic fluid were prepared in rubber stoppered flasks and similarly transferred every 3 or 4 days, while a third series of yolk-sac cultures in rubber stoppered flasks was passed every 8 or 9 days.

Table 1 summarizes the results obtained in titration tests carried out with the above culture preparations.

The data show that 3 of the 4 series of the cotton stoppered flask cultures were successfully carried through 15 transfers, but that the cultures consisting of minced embryo in modified Baker's solution were not active beyond the third passage. Those of yolk-sac suspended in ascitic fluid gave the highest average titer (10^{-5}). A slightly higher titer (10^{-6}) was reached by similarly prepared cultures in rubber stoppered flasks, while the best results (titer of 10^{-8}) were obtained by incubating the yolk-sac cultures in rubber stoppered flasks for 8 or 9 days before transferring.

TABLE 1.—*Comparative titration end-points of tissue cultures prepared in rubber stoppered and cotton stoppered flasks*

Type of culture	Tissue used	Suspension medium	Transfer interval, in days	Transfer number (in parentheses) and end-point of titration				
Cotton stoppered	Embryo	Baker's solution with 20 percent chicken serum.	3 to 4	10^{-1} (3)	[1] (6)	[1] (9)	------	------
Do	Yolk-sac	do	3 to 4	10^{-4} (3)	10^{-5} (6)	10^{-4} (9)	10^{-5} (12)	10^{-4} (15
Do	Embryo	Ascitic fluid	3 to 4	10^{-3} (3)	10^{-3} (6)	10^{-3} (9)	10^{-3} (12)	10^{-3} (15)
Do	Yolk-sac	do	3 to 4	10^{-5} (3)	10^{-6} (6)	10^{-5} (9)	10^{-6} (12)	10^{-5} (15)
Rubber stoppered	Embryo	do	3 to 4	10^{-3} (3)	10^{-4} (6)	10^{-3} (9)	10^{-3} (12)	10^{-3} (15)
Do	Yolk-sac	do	3 to 4	10^{-5} (3)	10^{-6} (6)	10^{-5} (9)	10^{-6} (12)	10^{-6} (16)
Do	do	do	8 to 9	10^{-7} (3)	10^{-8} (7)	10^{-8} (10)	10^{-8} (16)	10^{-8} (20)

[1] These cultures produced no reaction in guinea pigs and the latter were not immune.

Microscopic observations showed that relatively few rickettsiae were present in the cotton stoppered, minced-embryo cultures, and occasionally cultures were encountered in which only one or two organisms could be found in an oil-immersion field. The 3 or 4 day passage yolk-sac cultures (both cotton and rubber stoppered flasks) showed many typical organisms, but in addition these cultures contained relatively large numbers of very minute, faintly stained, short rod or coccoid forms existing both intra- and extracellularly. These minute forms were rather consistently observed in the 3 or 4 day transfer cultures and it is believed that they represent a smaller form of the organism. These minute forms were only rarely present in the cultures transferred every 8 or 9 days.

A second experiment was performed to compare the yield of rickettsiae when both cotton and rubber stoppered flask cultures were transferred every 8 or 9 days. Minced embryo and yolk-sac suspended in ascitic fluid were again used. No significant difference in the number

of rickettsiae was now observed, but the cotton stoppered cultures did show a considerable loss of volume due to evaporation of the suspension medium. The yolk-sac cultures again showed better growth of rickettsiae than the embryo cultures.

Growth under complete hydrogen tension.—Two experiments were carried out in an attempt to grow rickettsiae in yolk-sac-ascitic fluid cultures in cotton stoppered flasks under complete hydrogen tension in a McIntosh-Fildes jar. Animal inoculation tests and microscopic examinations showed that rickettsiae were present in the first subculture but not in the second or succeeding subcultures.

Growth in the tissues of the developing chick embryo.—A passage strain of *Rickettsia diaporica* has been readily maintained in the developing chick embryo for over 50 serial transfers. In the first 9 transfers, the embryo remained alive until the seventh or eighth day, but the strain gradually increased in virulence so that toward the thirtieth transfer most embryos were dying on the fifth or sixth day.

Infectivity tests.—The titration tests of modified Maitland cultures already described have clearly shown that yolk-sac cultures are more infectious than cultures containing other tissues of the developing chick. However, yolk-sac suspensions from inoculated eggs show infective titers 10 to 1,000 times greater than even the best of the yolk-sac tissue cultures.

Table 2 summarizes some of the results of titration tests of various chick embryo tissues. The data show that yolk-sac suspensions regularly contain at least a billion infectious units per gram of tissue and titers as high as 10 and 100 billion have been obtained.

TABLE 2.—*Comparative titration end-points of tissues of the developing chick*

Transfer number	Tissue titrated	Titration end-point	Transfer number	Tissue titrated	Titration end-point
10	Embryo	10^{-7}	32	Embryo	Not tested.
	Chorio-allantois	10^{-7}		Chorio-allantois	Not tested.
	Yolk-sac	10^{-11}		Yolk-sac	10^{-10}
14	Embryo	10^{-6}	38	Embryo	10^{-5}
	Chorio-allantois	10^{-7}		Chorio-allantois	10^{-6}
	Yolk-sac	10^{-9}		Yolk-sac	10^{-9}
18	Embryo	2×10^{-7}			
	Chorio-allantois	2×10^{-7}			
	Yolk-sac	2×10^{-10}			

This rickettsia shows similarity to all the other rickettsiae thus far studied in that yolk-sac suspensions produce in guinea pigs a shortened incubation period and a more severe infection (*3*). Thus, guinea pigs receiving a subcutaneous or intraperitoneal injection of 1 cc. of a 10-percent yolk-sac suspension of *R. diaporica* as a rule show fever within 24 to 48 hours and die 7 to 12 days later, whereas animals similarly injected with a 10-percent spleen suspension rarely show fever

before the fourth day and frequently die 2 to 3 weeks after the temperature has become normal.

Presence of rickettsiae.—No rickettsiae were found in tissue smears of eggs of the first 4 transfers. Beginning with the fifth passage, however, yolk-sac smears showed tremendous numbers of faintly staining, minute, rod-like or coccoid forms both intra- and extracellularly. These forms were indistinguishable from those observed in the modified Maitland, yolk-sac cultures transferred every 3 or 4 days. Smears similarly prepared from the chorio-allantois and embryo proper showed no organisms. Smears prepared from yolk-sac of the sixth passage eggs showed large numbers of the minute forms, but in addition there were considerable numbers of bipolar rods, diplococcoid and diplobacillary forms. Also a few chain forms, each containing 5 or 6 short rods, were seen. Nearly all organisms were extracellular. Beginning with the eighth transfer tremendous numbers of the larger forms were seen in yolk-sac smears, while markedly fewer organisms were found in smears prepared from the chorio-allantois and tissues of the embryo proper.

FILTERABILITY OF CULTURES

Centrifuged suspensions of yolk-sac tissue in Tyrode's representing the fourteenth and twenty-second passages in eggs were passed through new Berkefeld N filters and the filtrates inoculated into eggs. In both experiments the filtrates were centrifuged at 5,000 r. p. m. for 1 hour and the sediments stained with Giemsa and examined microscopically. No rickettsiae were found. However, large numbers of typical rickettsiae and also of the minute forms were found in smears of yolk-sac tissue prepared from the inoculated eggs. Subsequent passages in eggs showed the typical picture of tremendous numbers of rickettsiae in the yolk-sac tissue.

Our inability to demonstrate visible organisms in filtrates or in filtrate sediments suggests that there is an invisible, filterable phase of the organism that we are unable to observe microscopically.

DISCUSSION

The results of these experiments show that *Rickettsia diaporica* grows more readily in yolk-sac than in other tissues of the developing chick embryo or in modified Maitland cultures. Similar findings have previously been reported for rickettsiae of the Rocky Mountain spotted fever and typhus groups (*3*, *5*, *6*). *R. diaporica*, however, has shown more profuse growth, and yolk-sac suspensions prepared from the developing chick have given infective titers higher than any of the other rickettsiae thus far studied. The nearest approach to the exceedingly high titers recorded for *R. diaporica* have

been obtained with yolk-sac suspensions of the rickettsiae of "Q" fever and of endemic and epidemic typhus (*6*). These latter agents have rather consistently maintained an infective titer of 1 : 1 billion when grown in the yolk-sac of the developing chick.

In conjunction with Dr. C. B. Philip, of this laboratory, it has recently been found that the viscera and feces of infected adult and nymphal *Dermacentor andersoni* contain tremendous numbers of *R. diaporica*, and titration tests with these materials have given infective titers as high as those recorded for suspensions of the yolk-sac of the developing chick (*7*). The great number of rickettsiae found in the yolk-sac of inoculated eggs and in infected tick tissues and feces has made it possible to prepare from each of these sources, by fractional centrifugation, practically pure suspensions of rickettsiae suitable for agglutination purposes. Moreover, vaccines which protect guinea pigs against the experimental disease have been prepared from each of these sources (*6, 7*).

SUMMARY

Experiments are described in which *Rickettsia diaporica* was cultivated in a variety of tissue cultures consisting of various chick embryonic tissues in different suspension media. Both cotton stoppered and rubber stoppered flasks were used. The best results were obtained with rubber stoppered flasks containing minced yolk-sac tissue suspended in filtered human ascitic fluid, transfers being made every 8 to 12 days. By this method a series of cultures has been carried through 38 consecutive transfers with the infective titer being maintained rather consistently at 1×10^{-7} to 1×10^{-8}. Tissue cultures prepared with minced chorio-allantois or embryo proper as a rule showed fewer rickettsiae and an infective titer 100 to 1,000 times less.

This rickettsia apparently cannot be cultivated under complete hydrogen tension.

A passage strain of *R. diaporica* has been readily maintained in serial passage in incubating fertile eggs for over 50 transfers. Tremendous numbers of rickettsiae were found in the yolk-sac. Yolk-sac suspensions are consistently more infectious than other tissues of the developing chick embryo and as a rule show infective titers ranging from 1:1 billion to 1:100 billion, or 10 to 1,000 times greater than the highest titers obtained with tissue culture preparations.

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RELAPSING FEVER: *ORNITHODOROS HERMSI* A VECTOR IN COLORADO [1]

By GORDON E. DAVIS, *Bacteriologist, United States Public Health Service*

The earliest known endemic focus of relapsing fever in the United States is in Colorado. In 1915, Dr. C. N. Meador [2] reported 5 cases contracted in Bear Creek Canyon, Jefferson County, in the mountains west of Denver. Spirochetes were demonstrated in the blood of 2 patients. Meador was aware of the role played by ticks in Africa, but since tick transmission was then unknown in this country, he suggested as the source of his cases a band of gypsies who stopped at the tent used by 4 of the patients. In 1917 Dr. James J. Waring reported another case from the same locality. Spirochetes were again demonstrated. Waring expressed no opinion as to the means of infection, but mentioned ticks, body lice, and bedbugs as suspected vectors in other countries. He did, however, stress the endemicity of the disease. The possible implication of biting flies had been suggested to him, but concerning this he remarked, "It is highly improbable that these flies have anything to do with the transmission of this disease." Suspicious cases from the same locality were also reported to Dr. Waring in both 1916 and 1917, but were not confirmed.

A case treated by Drs. Hagood, Downey, and Wilson, of Whittier, Calif., in 1923, is attributed to Colorado, location unknown.

No further infections were reported from this general area until 1930, when Dr. Paul J. Connor [3] treated a case originating near Estes Park. In 1937 Dr. Wilfred S. Dennis [3] reported 2 cases that became infected on Genesee Mountain west of Denver. Spirochetes were demonstrated in all 3 of these cases.

In 1938 Dr. A. T. Monismith [3] of Fort Upton advised the Rocky Mountain Laboratory of 2 cases, one in June and the other in July, occurring in northeastern Park County about 40 miles southwest of

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[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.

[2] Dr. Meador and Drs. Waring, Connor, and Dennis mentioned below were all physicians practicing in Denver, Colo.

[3] These cases were reported in correspondence with the attending physicians.

Denver. The presence of spirochetes was not shown, but the clinical symptoms were typical. He also reported several cases as having occurred near Durango, La Plata County, in southwestern Colorado, about 20 years previously, he himself having been one of the patients.

Two cases were reported in July 1939, but have not been confirmed.

FIELD STUDIES

In the summer of 1937 an extensive search was made in the Bear Creek Canyon and the Estes Park areas for ticks of the genus *Ornithodoros*, species of which are now known to be the transmitting agents of relapsing fever in the United States. In July 1938 studies were made in the locality from which Dr. Dennis' patients became infected. Native rodents and their burrows were examined in all these localities, with negative results.

In September 1938, observations were made in the locality in which Doctor Monismith's 2 cases had originated earlier in the season. The mountain cabin which had been occupied by the patients was carefully examined. Though loosely constructed in part, there was no evidence of rodents within and no rodent signs were seen during a 2-day observation period. Subsequently, the owner of the cabin reported that a "nest" was found when removing the wall coverings. Incidentally, the cabin had been thoroughly cleaned following the illnesses, and hay-stuffed mattresses had been emptied and the contents burned. No rodents were seen locally except chipmunks (*Eutamias* sp.) around haystacks on an adjoining ranch. Several were examined but were free from ticks.

However, 51 *Ornithodoros* ticks were collected from a chipmunk's nest found in a decaying Douglas fir stump on a nearby hillside and from crevices in the rotting wood. The elevation is approximately 8,800 feet. These ticks have been identified by Entomologist R. A. Cooley as *O. hermsi* Wheeler. This is the first record of a relapsing fever spirochete-transmitting species of *Ornithodoros* in eastern Colorado. Spirochetes were not recovered from this lot. However, on June 11, 1939, 213 *hermsi* were collected from another decaying Douglas fir stump in the same locality. Two hundred and four of these were tested in 20 groups of 10 each and one group of 4 by feeding on young white rats. Spirochetes appeared in the peripheral blood of 3 rats. Progeny from these ticks also proved infective.

This tick has previously been known only in Placer, San Bernardino, and San Benito Counties, Calif., and in an area near Moscow, Idaho. The author's observation in Colorado extends its known range eastward nearly 600 miles to beyond the continental divide. This at least suggests the possibility of sporadic occurrence of this species in a considerable part of the Rocky Mountain region.

The only other record of a spirochete-carrying species of *Ornithodoros* in Colorado is that of a single nymph of *O. parkeri* from a group of 8 prairie dogs (*Cynomys* sp.) collected in August 1938, in Moffat County (northwestern Colorado) by a field crew of the Public Health Service Plague Laboratory at San Francisco. Elsewhere this species has repeatedly been found spontaneously infected with spirochetes which cause relapsing fever in laboratory animals, but thus far they have not been definitely identified with infection in man (Davis, 1939).

SUMMARY

Relapsing fever is endemic in Colorado in a northern and southern strip of high mountainous country extending from at least as far south as northern Park County to at least as far north as Estes Park in Larimer County. Spirochetes have been recovered from *Ornithodoros hermsi* recently collected in this area. This species is, without doubt, a transmitting agent locally.

There is a possible endemic area near Durango in La Plata County.

Ornithodoros parkeri, a tick known to be naturally infected with spirochetes, occurs in the sagebrush desert section of northwestern Colorado, but no human cases have been reported in that part of the State.

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DEATHS DURING WEEK ENDED NOVEMBER 18, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 18, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	8,247	8,288
Average for 3 prior years	[1] 8,179	
Total deaths, first 46 weeks of year	378,492	372,263
Deaths under 1 year of age	506	487
Average for 3 prior years	[1] 492	
Deaths under 1 year of age, first 46 weeks of year	22,844	24,051
Data from industrial insurance companies:		
Policies in force	66,558,358	68,305,603
Number of death claims	12,092	13,082
Death claims per 1,000 policies in force, annual rate	9.5	10.0
Death claims per 1,000 policies, first 46 weeks of year, annual rate	9.9	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (--) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median
NEW ENG.												
Maine	48	8	10	1	6	1	1	------	284	47	8	26
New Hampshire	0	0	2	0	------	------	------	------	20	2	0	4
Vermont	0	0	1	1	------	------	------	------	523	39	3	3
Massachusetts	5	4	4	6	------	------	------	------	232	197	143	75
Rhode Island	8	1	1	0	------	------	------	------	412	54	1	4
Connecticut	0	0	2	2	3	1	10	4	178	60	30	55
MID. ATL.												
New York	7	17	20	30	[1] 5	[1] 7	[1] 14	[1] 14	52	129	348	348
New Jersey	19	16	6	11	14	12	6	8	13	11	8	28
Pennsylvania	21	42	45	45	------	------	------	------	12	23	62	133
E. NO. CEN.												
Ohio	13	17	46	51	7	9	------	6	12	15	18	101
Indiana	33	22	40	49	12	8	8	14	16	11	5	7
Illinois	26	39	42	64	13	20	12	12	12	18	18	22
Michigan [3]	13	12	16	18	------	------	1	1	193	183	23	37
Wisconsin	5	3	1	5	30	17	25	25	0	0	91	76
W. NO. CEN.												
Minnesota	12	6	10	7	6	3	------	1	136	70	141	41
Iowa	12	6	31	4	2	1	10	2	26	13	50	7
Missouri	21	16	22	47	------	------	14	41	36	28	5	17
North Dakota	0	0	2	2	7	1	8	8	7	1	220	8
South Dakota	45	6	8	2	------	------	1	------	15	2	42	9
Nebraska	4	1	4	7	------	------	------	------	8	2	5	3
Kansas	28	10	14	15	22	8	10	2	193	69	3	11
SO. ATL.												
Delaware	20	1	0	0	79	4	------	------	39	2	3	3
Maryland [3]	31	10	9	14	22	7	2	7	19	6	41	35
Dist. of Col.	0	0	7	8	------	------	------	------	32	4	1	1
Virginia	107	57	78	78	242	129	105	------	15	8	11	23
West Virginia	59	22	13	22	13	5	11	23	13	5	18	18

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median
SO. ATL.—con.												
North Carolina [3]	137	94	59	74	4	3	1	9	276	189	132	107
South Carolina [3]	41	15	12	10	1,702	623	274	267	11	4	6	6
Georgia [3]	56	34	21	27	450	271	15	------	5	3	23	0
Florida [3]	27	9	7	12	21	7	------	2	9	3	14	10
E. SO. CEN.												
Kentucky	28	16	25	27	17	10	26	17	3	2	10	11
Tennessee [3]	41	23	18	45	101	57	27	40	32	18	8	8
Alabama [3]	60	34	38	37	319	181	48	48	18	10	21	12
Mississippi [2] [3]	51	20	21	23	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	42	17	15	16	114	46	81	44	2	1	6	0
Louisiana [3]	81	13	20	24	22	9	5	5	2	1	41	8
Oklahoma	52	26	13	13	95	47	69	51	0	0	6	3
Texas [3]	46	55	54	54	276	333	209	147	72	87	3	6
MOUNTAIN												
Montana	19	2	0	2	421	45	6	3	150	16	176	19
Idaho	0	0	0	0	------	------	------	8	265	26	35	14
Wyoming	44	2	1	0	------	------	------	------	87	4	1	2
Colorado	19	4	7	9	43	9	36	------	101	21	3	5
New Mexico	49	4	1	5	12	1	------	3	25	2	3	24
Arizona	61	5	8	5	712	58	87	36	37	3	0	2
Utah [2]	0	0	11	1	219	22	7	------	447	45	12	12
PACIFIC												
Washington	12	4	2	2	------	------	------	------	891	289	48	31
Oregon	0	0	1	1	139	28	7	23	104	21	9	9
California [3]	21	25	40	42	13	16	25	33	122	149	366	148
Total	29	718	808	947	94	1,999	1,161	913	77	1,893	2,221	2,221
47 weeks	18	21,106	26,255	26,255	163	162,712	57,179	111,757	311	361,420	777,583	692,526

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, ases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	133	22	13	19
New Hampshire	0	0	0	0	0	0	0	0	41	4	7	6
Vermont	0	0	0	0	13	1	0	0	40	3	9	9
Massachusetts	0	0	1	1	1.2	1	0	0	62	53	95	163
Rhode Island	0	0	0	0	0	0	0	0	23	3	7	17
Connecticut	0	0	0	0	3	1	0	0	128	43	47	45
MID. ATL.												
New York	2	5	5	5	6	14	1	4	93	233	246	334
New Jersey	1.2	1	0	0	4	3	1	0	126	106	77	77
Pennsylvania	0.5	1	2	2	4	7	7	4	111	218	210	391
E. NO. CEN.												
Ohio	0	0	2	1	1.5	2	2	1	164	213	293	293
Indiana	0	0	0	1	3	2	0	0	181	122	142	142
Illinois	0	0	1	4	2	8	0	3	206	314	274	411
Michigan [1]	1.1	1	0	2	2.1	2	0	3	242	229	274	286
Wisconsin	0	0	0	0	12	7	0	0	255	145	175	225

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934-38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934-38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934-38, median
W. NO. CEN.												
Minnesota	0	0	1	1	17	9	1	2	277	143	82	102
Iowa	2	1	1	1	10	5	0	1	186	92	59	80
Missouri	1.3	1	2	2	0	0	2	2	104	81	86	112
North Dakota	0	0	0	0	7	1	0	0	212	29	23	31
South Dakota	0	0	0	0	0	0	0	0	286	38	24	26
Nebraska	0	0	0	0	23	6	0	0	80	21	20	27
Kansas	0	0	1	1	2.8	1	0	1	313	112	119	125
SO. ATL.												
Delaware	20	1	0	0	0	0	0	0	512	26	7	9
Maryland [2]	3	1	0	2	0	0	0	0	105	34	27	62
Dist. of Col	8	1	0	0	0	0	0	0	89	11	14	12
Virginia	1.9	1	2	4	4	2	0	0	148	79	42	51
West Virginia	11	4	3	2	8	3	0	0	306	114	88	104
North Carolina [3]	0	0	1	1	0	0	1	1	181	124	72	76
South Carolina [3]	0	0	2	0	2.7	1	0	0	44	16	14	6
Georgia [3]	1.7	1	1	1	0	0	1	0	61	37	27	23
Florida [3]	0	0	0	0	0	0	0	0	21	7	6	7
E. SO. CEN.												
Kentucky	0	0	3	2	3	2	0	1	167	96	94	75
Tennessee [3]	4	2	1	3	0	0	1	2	173	98	52	70
Alabama [3]	5	3	2	2	4	2	1	2	79	45	34	28
Mississippi [2] [3]	8	3	0	1	2.5	1	0	0	33	13	15	23
W. SO. CEN.												
Arkansas	2.5	1	2	0	5	2	1	1	57	23	13	13
Louisiana [3]	2.4	1	0	0	0	0	0	1	29	12	19	17
Oklahoma	0	0	1	1	2	1	0	0	54	27	27	22
Texas [3]	0.8	1	0	0	2.5	3	1	1	56	68	102	66
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	346	37	31	31
Idaho	10	1	0	0	41	4	0	0	61	6	15	24
Wyoming	0	0	0	0	0	0	0	0	87	4	3	10
Colorado	5	1	1	1	5	1	0	0	125	26	28	43
New Mexico	12	1	0	0	12	1	0	0	86	7	18	25
Arizona	0	0	1	0	0	0	0	1	98	8	5	14
Utah [2]	10	1	0	0	30	3	0	0	109	11	18	39
PACIFIC												
Washington	0	0	0	1	6	2	0	0	49	16	45	59
Oregon	5	1	1	0	5	1	0	0	124	25	44	44
California [3]	0	0	0	4	20	24	0	11	139	169	212	212
Total	1.4	35	37	68	5	118	20	61	134	3,363	3,354	4,048
47 weeks	1.5	1,793	2,626	4,998	6	6,920	1,616	7,021	121	143,500	167,502	199,748

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 25, 1939, rate	Nov. 25, 1930, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934–38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases
NEW ENG.											
Maine	0	0	0	0	6	1	1	1	296	49	29
New Hampshire	0	0	0	0	10	1	0	0	61	6	0
Vermont	0	0	0	0	13	1	0	1	1,046	78	50
Massachusetts	0	0	0	0	1	1	1	1	134	114	179
Rhode Island	0	0	0	0	0	0	2	0	122	16	18
Connecticut	0	0	0	0	6	2	2	2	229	77	78
MID. ATL.											
New York	0	0	0	0	3	7	10	10	134	334	578
New Jersey	0	0	0	0	4	3	2	2	138	116	273
Pennsylvania	0	0	0	0	7	14	9	15	142	279	376
E. NO. CEN.											
Ohio	0	0	2	0	2	2	2	5	75	98	189
Indiana	4	3	22	2	4	3	5	3	83	56	11
Illinois	0	0	0	1	4	6	6	11	82	125	447
Michigan [3]	3	3	3	0	3	3	6	4	115	109	213
Wisconsin	12	7	11	11	0	0	2	2	271	154	372
W. NO. CEN.											
Minnesota	41	21	8	8	0	0	1	0	140	72	23
Iowa	4	2	16	2	0	0	33	3	12	6	29
Missouri	0	0	4	4	8	6	1	13	26	20	10
North Dakota	0	0	16	16	0	0	0	0	44	6	18
South Dakota	15	2	0	6	0	0	0	0	15	2	3
Nebraska	0	0	1	0	8	2	0	0	15	4	5
Kansas	0	0	1	1	8	3	1	4	34	12	20
SO. ATL.											
Delaware	0	0	0	0	59	3	0	0	295	15	1
Maryland [3]	0	0	0	0	9	3	3	7	160	52	31
Dist. of Col.	0	0	0	0	0	0	2	0	81	10	12
Virginia	0	0	0	0	17	9	3	13	37	20	13
West Virginia	0	0	0	0	11	4	5	5	35	13	34
North Carolina [3]	0	0	0	0	0	0	2	4	92	63	214
South Carolina [3]	0	0	0	0	0	0	2	2	22	8	19
Georgia [3]	0	0	1	0	15	9	3	3	13	8	5
Florida [3]	0	0	0	0	0	0	0	1	15	5	9
E. SO. CEN.											
Kentucky	0	0	2	0	7	4	15	14	71	41	9
Tennessee [3]	0	0	0	0	5	3	5	5	39	22	27
Alabama [3]	0	0	0	0	5	3	8	6	56	32	66
Mississippi [2,3]	0	0	0	0	3	1	2	4	-------	-------	-------
W. SO. CEN.											
Arkansas	0	0	2	2	17	7	7	4	7	3	26
Louisiana [3]	0	0	0	0	22	9	4	9	104	43	16
Oklahoma	10	5	5	0	4	2	8	11	14	7	0
Texas [3]	8	10	3	0	15	18	20	31	27	33	41
MOUNTAIN											
Montana	0	0	1	23	0	0	0	0	28	3	46
Idaho	0	0	3	1	10	1	5	2	20	2	1
Wyoming	0	0	0	2	22	1	0	0	175	8	1
Colorado	5	1	12	3	5	1	4	2	58	11	10
New Mexico	0	0	0	0	12	1	1	5	87	3	2
Arizona	0	0	4	0	12	1	2	2	184	15	2
Utah [3]	10	1	0	0	10	1	0	0	864	87	14

Cases of certain diseases reported by telegraph by State health officers for the week ended November 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934-38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases	1934-38, median	Nov. 25, 1939, rate	Nov. 25, 1939, cases	Nov. 26, 1938, cases
PACIFIC											
Washington	9	3	3	24	6	2	4	2	37	12	12
Oregon	0	0	4	3	10	2	1	1	134	27	16
California [3]	2	2	3	3	12	15	4	7	86	105	123
Total	2	60	127	127	6	155	194	230	96	2,381	3,671
47 weeks	8	9,122	123,522	6,688	10	12,077	13,598	14,321	137	159,786	190,807

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov 25, 1939, 53 cases as follows: North Carolina, 1; South Carolina, 5; Georgia, 21; Florida, 1; Tennessee, 2; Alabama, 10; Mississippi, 1; Louisiana, 3; Texas, 7; California, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
September 1939										
Puerto Rico	25	17	1,300	45	0	4	0	0	0	31
October 1939										
District of Columbia	40	1		3	1		2	39	0	5
Florida	24	7	50	24	5	7	2	22	0	6
Georgia	229	130	344	12	3	17	8	147	0	45
Hawaii Territory	6	3		2	0		5	2	0	4
Illinois	112	23	37	64	8	1	28	683	2	86
Kansas	23	24	2	156	3	1	10	308	2	20
Louisiana	85	34	37	5	1	9	1	37	0	39
Mississippi	83	2,994	4,727	77	1	303	2	53	0	9
Montana	39	20		152	0		1	110	0	11
Ohio	157	50	1	71	2		33	762	3	49
Oklahoma	42	156	179	9	3	12	11	58	5	50
Rhode Island	1			72	1		0	13	0	6
Washington	9	6		970	3		5	147	3	18

Summary of monthly reports from States—Continued

September 1939

	Cases
Puerto Rico:	
Chickenpox	2
Dysentery	14
Leprosy	3
Mumps	1
Ophthalmia neonatorum	1
Puerperal septicemia	5
Tetanus	13
Tetanus, infantile	13
Whooping cough	59

October 1939

	Cases
Actinomycosis:	
Illinois	2
Chickenpox:	
District of Columbia	39
Florida	9
Georgia	15
Hawaii Territory	26
Illinois	450
Kansas	147
Louisiana	2
Mississippi	168
Montana	129
Ohio	586
Oklahoma	9
Rhode Island	25
Washington	345
Conjunctivitis, infectious:	
Georgia	26
Hawaii Territory	51
Dengue:	
Florida	1
Georgia	5
Diarrhea:	
Ohio (under 2 years; enteritis included)	54
Dysentery:	
Georgia (amoebic)	11
Georgia (bacillary)	9
Georgia (unspecified)	3
Hawaii Territory (amoebic)	5
Illinois (amoebic)	8
Illinois (amoebic carriers)	14
Illinois (bacillary)	29
Kansas (amoebic)	1
Kansas (bacillary)	3
Louisiana (amoebic)	12
Louisiana (bacillary)	1
Mississippi (amoebic)	149
Mississippi (bacillary)	348
Ohio (amoebic)	1
Ohio (bacillary)	17
Oklahoma (amoebic)	2
Oklahoma (bacillary)	44
Rhode Island (bacillary)	8
Washington (bacillary)	3
Encephalitis, epidemic or lethargic:	
Florida	1
Illinois	7
Kansas	14
Montana	1
Ohio	6
Oklahoma	1
Washington	3

October 1939—Continued

	Cases
Favus:	
Georgia	3
Food poisoning:	
Illinois	5
German measles:	
Hawaii Territory	6
Illinois	26
Kansas	2
Ohio	13
Rhode Island	2
Washington	16
Hookworm disease:	
Florida	29
Georgia	2,503
Hawaii Territory	3
Louisiana	13
Mississippi	604
Impetigo contagiosa:	
Hawaii Territory	34
Illinois	20
Kansas	7
Montana	10
Ohio	57
Oklahoma	10
Washington	4
Jaundice, acute epidemic:	
Hawaii Territory	1
Lead poisoning:	
Ohio	5
Leprosy:	
Hawaii Territory	2
Mumps:	
Florida	9
Georgia	46
Hawaii Territory	33
Illinois	94
Kansas	62
Louisiana	1
Mississippi	150
Montana	49
Ohio	232
Oklahoma	11
Rhode Island	101
Washington	28
Ophthalmia neonatorum:	
Illinois	4
Florida	1
Mississippi	11
Puerperal septicemia:	
Mississippi	26
Ohio	1
Rabies in animals:	
Florida	3
Illinois	20
Louisiana	10
Mississippi	3
Oklahoma	22
Rhode Island	4
Washington	13
Rabies in man:	
Ohio	1
Relapsing fever:	
Kansas	1
Rocky Mountain spotted fever:	
Washington	1
Scabies:	
Kansas	11
Montana	6
Washington	7

October 1939—Continued

	Cases
Screw worm infection:	
Georgia	1
Septic sore throat:	
Florida	3
Georgia	48
Illinois	4
Kansas	11
Louisiana	7
Montana	2
Ohio	12
Oklahoma	28
Rhode Island	11
Washington	5
Tetanus:	
Florida	2
Georgia	1
Hawaii Territory	2
Illinois	5
Louisiana	7
Ohio	2
Trachoma:	
Florida	1
Illinois	40
Kansas	1
Mississippi	11
Ohio	8
Oklahoma	79
Trichinosis:	
Illinois	1
Tularaemia:	
Georgia	1
Illinois	10
Kansas	5
Louisiana	3
Typhus fever:	
Florida	7
Georgia	115
Hawaii Territory	7
Louisiana	15
Mississippi	6
Undulant fever:	
District of Columbia	2
Florida	7
Georgia	3
Illinois	17
Kansas	5
Louisiana	3
Mississippi	1
Ohio	7
Oklahoma	21
Rhode Island	3
Washington	1
Vincent's infection:	
Florida	16
Illinois	34
Kansas	11
Oklahoma	10
Whooping cough:	
District of Columbia	61
Florida	8
Georgia	59
Hawaii Territory	176
Illinois	744
Kansas	24
Louisiana	106
Mississippi	604
Montana	15
Ohio	624
Oklahoma	2
Rhode Island	75
Washington	46

CASES OF VENEREAL DISEASES REPORTED FOR SEPTEMBER 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,399	4.83	397	1.37
Arizona	188	4 56	97	2.35
Arkansas	821	4.01	144	.70
California	1,738	2.82	1,467	2.38
Colorado	93	.87	78	.73
Connecticut	168	.96	103	.59
Delaware	203	7.78	56	2.15
District of Columbia	426	6.79	302	4.82
Florida	2,485	14 88	180	1.08
Georgia	2,094	6.79	41	.13
Idaho	30	.61	20	.41
Illinois	2,071	2.63	1,563	1.98
Indiana	559	1 61	109	.31
Iowa	281	1.10	135	.53
Kansas	207	1.11	132	.71
Kentucky	585	2 00	287	.98
Louisiana	892	4.18	89	.42
Maine	36	.42	53	.62
Maryland	934	5.56	325	1.94
Massachusetts	335	.76	419	.95
Michigan	1,076	2.23	680	1.41
Minnesota	236	.89	175	.66
Mississippi	2,272	11.23	2,521	12.46
Missouri	633	1.59	235	.59
Montana	37	.69	19	.35
Nebraska	62	.45	73	.54
Nevada	50	4.95	8	.79
New Hampshire	22	.43	15	.29
New Jersey	979	2 25	302	.70
New Mexico	142	3.36	46	1.09
New York	3,597	2 78	1,602	1.24
North Carolina	2,669	7 64	413	1.18
North Dakota	27	.38	47	.67
Ohio	1,200	1 78	523	.78
Oklahoma	847	3 32	356	1.40
Oregon	89	87	136	1.32
Pennsylvania	1,257	1.24	142	.14
Rhode Island	131	1 92	76	1.12
South Carolina	1,338	7.14	310	1.65
South Dakota	24	.35	17	.25
Tennessee	1,241	4.29	617	2.13
Texas	4,222	6.84	1,056	1.71
Utah	17	.33	36	.69
Vermont	13	.34	24	.63
Virginia	1,748	6.46	351	1.30
Washington	172	1.04	276	1.66
West Virginia	284	1.52	143	.77
Wisconsin	53	.18	141	.48
Wyoming	18	.77	19	.81
Hawaii	50	1.23	41	1.01
Virgin Islands	43	19.55	23	10.45
Total	40,124	3 09	16,420	1.27

Reports from cities of 200,000 population or over [1]

Akron, Ohio	29	1.05	28	1.02
Atlanta, Ga	878	12.59	108	3.60
Baltimore, Md	569	10.41	214	2.56
Birmingham, Ala	235	7.98	50	1.70
Boston, Mass	121	1.52	127	1.60
Buffalo, N. Y	181	3.01	55	.91
Chicago, Ill	1,242	3.39	1,008	2.75
Cincinnati, Ohio	157	3.32	124	2.62

[1] No reports received from Kansas City, Mo., Los Angeles, Calif., Milwaukee, Wis., Newark, N. J., New Orleans, La., St. Louis, Mo., San Antonio, Tex., or Toledo, Ohio.

Reports from cities of 200,000 population or over—Continued

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Cleveland, Ohio	269	2.85	102	1.08
Columbus, Ohio	73	2.33	39	1.24
Dallas, Tex	197	6.48	125	4.11
Dayton, Ohio	79	3.56	38	1.71
Denver, Colo	59	1.96	46	1.53
Detroit, Mich	556	3.06	341	1.88
Houston, Tex	308	8.59	118	3.29
Indianapolis, Ind	12	.31	34	.88
Jersey City, N. J	44	1.36	16	.49
Louisville, Ky	183	5.40	70	2.07
Memphis, Tenn	281	9.62	197	6.75
Minneapolis, Minn	48	.96	36	.72
New York, N. Y	2,461	4.00	1,166	1.56
Oakland, Calif	67	2.14	35	1.12
Omaha, Nebr	25	1.12	31	1.39
Philadelphia, Pa	538	2.68	----------	----------
Pittsburgh, Pa	256	3.63	19	.27
Portland, Oreg	87	2.71	94	2.93
Providence, R. I	85	3.27	45	1.73
Rochester, N. Y	24	.70	38	1.11
St. Paul, Minn	29	1.01	27	.94
San Francisco, Calif	104	1.51	146	2.12
Seattle, Wash	76	1.96	90	2.32
Syracuse, N. Y	69	3.06	7	.31
Washington, D. C	426	6.79	302	4.82

WEEKLY REPORTS FROM CITIES

City reports for week ended Nov. 18, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	236	124	36	607	518	1,110	7	334	34	1,050	--------
Current week [1]	158	134	20	511	416	790	1	307	28	753	--------
Maine:											
Portland	0	-------	0	14	0	3	0	2	0	3	23
New Hampshire:											
Concord	0	-------	0	3	0	0	0	0	0	0	12
Manchester	0	-------	1	0	0	0	0	0	0	0	19
Nashua	0	-------	0	0	0	0	0	0	0	0	4
Vermont:											
Barre	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Burlington	0	-------	0	0	0	0	0	0	0	8	11
Rutland	0	-------	0	0	1	0	0	0	0	0	5
Massachusetts:											
Boston	2	-------	0	23	15	19	0	5	0	19	197
Fall River	1	-------	0	0	4	0	0	3	0	11	34
Springfield	0	-------	0	0	2	0	1	2	0	7	35
Worcester	0	-------	0	4	6	5	0	0	1	5	36
Rhode Island:											
Pawtucket	0	-------	0	0	0	1	0	0	0	1	21
Providence	0	-------	0	58	2	2	0	1	0	18	55
Connecticut:											
Bridgeport	0	-------	0	0	0	2	0	0	1	1	40
Hartford	0	-------	0	0	2	8	0	0	0	28	40
New Haven	0	-------	0	6	1	6	0	0	0	2	41
New York:											
Buffalo	1	-------	0	3	9	6	0	4	0	4	136
New York	18	11	1	13	61	70	0	84	1	89	1,441
Rochester	0	-------	0	4	3	2	0	1	0	5	53
Syracuse	0	-------	0	0	4	3	0	0	0	21	50

[1] Figures for Barre estimated; report not received.

City reports for week ended Nov. 18, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	4		0	0	0	2	0	1	0	0	27
Newark	0	2	0	3	5	15	0	6	2	20	117
Trenton	0		0	0	2	0	0	2	0	1	27
Pennsylvania:											
Philadelphia	5	2	0	4	23	20	0	23	1	92	462
Pittsburgh	2	1	3	2	13	18	0	7	0	13	160
Reading	0		0	1	1	1	0	0	0	0	19
Scranton	0			0		1	0		0	3	
Ohio:											
Cincinnati	10		0	1	4	14	0	9	0	4	145
Cleveland	8	20	2	3	20	42	0	10	0	35	205
Columbus	7	1	1	2	4	5	0	1	0	2	78
Toledo	0		0	7	0	14	0	3	0	15	69
Indiana:											
Anderson	0		0	0	1	2	1	0	0	7	7
Fort Wayne	0		0	0	0	5	0	0	0	0	27
Indianapolis	5		0	6	7	18	0	5	1	13	96
Muncie	0		0	1	0	3	0	0	0	0	10
South Bend	0		0	2	1	1	0	0	0	5	15
Terre Haute	1		0	0	1	1	0	0	0	0	21
Illinois:											
Alton	0		0	0	3	0	0	0	0	0	10
Chicago	21	8	0	8	25	134	0	37	1	55	679
Elgin	0		0	0	1	1	0	1	0	5	6
Moline	0		0	0	0	2	0	0	0	1	7
Springfield	0		0	0	9	0	0	0	0	5	36
Michigan:											
Detroit	6		0	9	11	59	0	8	0	28	211
Flint	0		0	1	2	5	0	2	0	15	28
Grand Rapids	0		0	3	0	18	0	1	0	2	32
Wisconsin.											
Kenosha	0		0	1	0	1	0	0	0	4	12
Madison	0		0	0	2	0	0	0	0	11	18
Milwaukee	0	1	1	2	8	45	0	0	0	18	83
Racine	0		0	3	0	1	0	0	0	2	11
Superior	0		0	0	0	3	0	0	0	0	5
Minnesota:											
Duluth	0		0	39	0	4	0	0	0	0	20
Minneapolis	0		0	2	5	27	0	1	0	7	95
St. Paul	0		0	2	8	11	0	2	0	27	59
Iowa											
Cedar Rapids	0			0		0	0		0	0	
Davenport	3			0		7	0		0	0	
Des Moines	0		0	1	0	16	0	0	0	1	36
Sioux City	0			0		8	0		0	0	
Waterloo	1			2		5	0		0	1	
Missouri:											
Kansas City	0		1	0	4	9	0	4	0	1	93
St Joseph	0		0	0	1	2	0	0	1	0	16
St. Louis	11		0	3	7	16	0	2	0	10	187
North Dakota:											
Fargo	0		0	0	8	3	0	0	0	1	9
Grand Forks	0			1		0	0		0	1	
Minot	1		0	0	0	2	0	0	0	0	8
South Dakota:											
Aberdeen	0			0		3	0		0	0	
Sioux Falls	0		0	0	0	12	0	0	0	0	9
Nebraska:											
Lincoln	0			0		1	0		0	3	
Omaha	0		0	1	7	3	0	0	0	2	63
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	7
Topeka	0		0	2	2	7	0	1	0	0	29
Wichita	2		1	41	3	0	0	0	1	0	37
Delaware:											
Wilmington	1		0	0	3	1	0	0	0	7	35
Maryland:											
Baltimore	2	5	1	1	12	8	0	8	0	44	206
Cumberland	0		0	1	0	6	0	0	0	0	11
Frederick	1		0	0	2	3	0	0	0	0	2
Dist. of Col.:											
Washington	2		0	1	3	6	0	11	2	11	160
Virginia:											
Lynchburg	2		0	0	0	2	0	0	1	4	12
Norfolk	0		0	1	0	2	0	0	0	0	16
Richmond	5		2	4	5	6	0	1	0	2	62
Roanoke	0		0	0	0	1	0	0	0	5	14

City reports for week ended Nov. 18, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
West Virginia:											
Charleston	2	1	0	0	0	4	0	1	1	0	10
Huntington	0	-------	-------	0	-------	0	0	-------	0	0	-------
Wheeling	1	-------	0	0	0	0	0	1	0	0	25
North Carolina:											
Gastonia	1	-------	-------	0	-------	0	0	-------	0	0	-------
Raleigh	0	-------	0	1	3	2	0	0	0	0	22
Wilmington	2	-------	0	0	0	0	0	1	0	0	17
Winston-Salem	2	-------	0	0	2	4	0	0	0	0	23
South Carolina:											
Charleston	0	23	0	0	2	0	0	0	2	0	16
Florence	0	7	0	1	4	1	0	0	0	0	15
Greenville	0	-------	1	0	1	0	0	0	0	0	19
Georgia:											
Atlanta	2	6	1	0	6	11	0	6	1	0	108
Brunswick	0	-------	0	0	1	1	0	0	0	0	5
Savannah	8	9	0	0	1	3	0	0	0	2	26
Florida:											
Miami	0	1	0	0	3	1	0	1	0	1	35
Tampa	0	-------	0	0	0	0	0	1	0	0	23
Kentucky:											
Ashland	0	2	0	0	2	1	0	0	0	0	8
Covington	0	-------	0	0	1	2	0	2	0	0	11
Lexington	0	-------	0	0	2	2	0	1	0	0	12
Louisville	0	1	0	1	4	17	0	8	0	24	85
Tennessee:											
Knoxville	1	1	0	0	8	11	0	0	0	0	18
Memphis	0	1	0	1	2	5	0	6	0	17	64
Nashville	3	-------	0	0	3	2	0	2	0	8	43
Alabama:											
Birmingham	5	14	0	1	4	5	0	4	0	0	78
Mobile	2	1	0	0	2	8	0	0	0	0	15
Arkansas:											
Fort Smith	0	1	-------	0	-------	1	0	-------	0	0	-------
Little Rock	0	1	0	0	3	1	0	1	0	0	-------
Louisiana:											
Lake Charles	0	-------	0	0	0	2	0	0	0	0	8
New Orleans	2	1	0	1	17	5	0	8	2	1	172
Shreveport	2	-------	0	1	3	2	0	0	0	0	31
Oklahoma:											
Oklahoma City	0	4	0	8	2	4	0	2	0	0	43
Tulsa	0	-------	-------	0	-------	3	0	-------	0	0	-------
Texas:											
Dallas	1	2	2	0	5	5	0	1	0	2	58
Galveston	0	-------	0	0	1	0	0	1	0	0	17
Houston	10	-------	0	0	11	6	0	6	0	1	81
San Antonio	1	2	1	13	1	0	0	7	2	0	59
Montana:											
Billings	0	-------	1	0	2	0	0	1	0	0	9
Great Falls	0	-------	0	1	1	2	0	0	0	0	11
Helena	0	1	1	0	0	0	0	0	0	0	6
Missoula	0	-------	0	0	1	0	0	0	0	2	3
Idaho:											
Boise	0	-------	0	0	1	0	0	0	0	0	7
Colorado:											
Colorado Springs	0	-------	1	1	2	3	0	3	0	4	16
Denver	3	-------	0	4	8	7	0	3	1	4	96
Pueblo	0	-------	0	0	1	1	0	1	1	0	11
New Mexico:											
Albuquerque	0	-------	0	1	0	1	0	1	0	4	6
Utah:											
Salt Lake City	0	-------	0	21	3	7	0	2	0	35	36
Washington:											
Seattle	0	-------	0	11	3	1	0	4	0	2	103
Spokane	0	1	1	3	1	6	0	0	1	0	32
Tacoma	0	-------	0	167	1	2	0	0	0	0	24
Oregon:											
Portland	1	-------	1	2	3	4	0	1	0	3	86
Salem	0	-------	-------	3	-------	0	0	-------	0	0	-------
California:											
Los Angeles	1	13	0	8	7	45	0	0	4	14	355
Sacramento	0	-------	0	0	3	2	0	0	0	0	34
San Francisco	4	-------	0	1	8	8	0	6	0	17	160

City reports for week ended Nov. 18, 1939—Continued

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Worcester	0	0	1
New York:			
Buffalo	0	0	2
New York	0	0	3
Rochester	0	0	1
Pennsylvania:			
Philadelphia	0	0	2
Ohio:			
Cincinnati	0	0	2
Cleveland	0	0	1
Indiana:			
Indianapolis	0	0	1
Illinois:			
Chicago	0	0	1
Michigan:			
Detroit	0	0	2
Wisconsin:			
Milwaukee	0	0	1
Minnesota:			
Minneapolis	0	0	1
St. Paul	0	0	1
Iowa:			
Des Moines	0	0	7
North Dakota:			
Fargo	0	0	1
Maryland:			
Baltimore	0	0	2
District of Columbia:			
Washington	0	0	3
West Virginia:			
Wheeling	1	0	0
Alabama:			
Mobile	0	1	1
Arkansas:			
Little Rock	0	0	2
Louisiana:			
New Orleans	1	1	0
Colorado:			
Denver	0	0	2
Pueblo	0	0	3
Utah:			
Salt Lake City	0	0	3
California:			
Los Angeles	0	0	2
Sacramento	0	0	1
San Francisco	1	0	2

Pellagra.—Cases: Philadelphia, 1; Lynchburg, 1; Savannah, 1, Louisville, 1.

Typhus fever.—Cases: New York, 3; Charleston, S. C., 2, Atlanta, 6; Savannah, 1; Tampa, 2; Mobile, 1; Dallas, 1; Los Angeles, 2.

FOREIGN REPORTS

BRAZIL

Rio de Janeiro—Poliomyelitis.—According to a report dated November 6, 1939, an epidemic of poliomyelitis was present in Rio de Janeiro, Brazil, where a total of 89 cases with 5 deaths occurred during the first 4 weeks of October, as follows:

Week ended—	*Cases*	*Deaths*
Oct. 7	9	0
Oct. 14	6	1
Oct. 21	39	2
Oct. 28	35	2

CANADA

Provinces—Communicable diseases—Week ended November 11, 1939.—During the week ended November 11, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					5					5
Chickenpox		12	2	142	281	36	53	51	50	627
Diphtheria		3	3	60	1	6				73
Dysentery					3				1	4
Influenza		48			13	2			3	66
Measles		7		154	251	17	31	2	42	504
Mumps				65	68	4	6		3	146
Pneumonia		7			34	2			7	50
Poliomyelitis				3	5					8
Scarlet fever	12	21	14	88	152	21	15	14	19	356
Trachoma						6				6
Tuberculosis	1	9	5	32	37	26		2		112
Typhoid and paratyphoid fever				23	2	1	1	2	1	30
Whooping cough		27		45	54	28	8	14	4	180

IRAQ

Anthrax.—According to a report dated November 22, 1939, 11 cases of human anthrax were reported in Iraq during the first 3 weeks of October 1939.

ITALY

Communicable diseases—4 weeks ended August 13, 1939.—During the 4 weeks ended August 13, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	July 17-23	July 24-30	July 31-Aug 6	Aug. 7-13
Anthrax	29	25	32	37
Cerebrospinal meningitis	19	14	15	17
Chickenpox	244	226	133	101
Diphtheria	396	377	428	415
Dysentery (amoebic)	44	31	29	15
Dysentery (bacillary)	5	9	24	49
Hookworm disease	10	23	23	24
Lethargic encephalitis		1	2	1
Measles	839	692	519	459
Mumps	155	135	105	108
Paratyphoid fever	81	112	177	148
Pellagra	11	13	6	11
Poliomyelitis	259	208	221	202
Puerperal fever	25	27	20	22
Rabies	1			
Scarlet fever	169	170	196	169
Typhoid fever	595	677	793	867
Undulant fever	113	92	102	82
Whooping cough	615	607	567	471

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of November 24, 1939, pages 2106–2119. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Tientsin.—A report dated November 10, 1939, states that since September 27, 1939, 33 cases of cholera with 14 deaths had been reported in Tientsin, China.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill area.—A rat found on October 31, 1939, in Hamakua Mill area, about 2 miles from Paauilo village, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Peru.—During the month of September 1939, plague has been reported in the following Departments of Peru: Cajamarca, 4 cases, 1 death; Libertad, 1 case, 1 death; Lima, 1 case, 1 death; Piura, 5 cases.

Smallpox

Venezuela.—For the period October 16–31, 1939, smallpox (alastrim) was reported in Venezuela as follows: Caracas, 4 cases; Puerto Cabello, 5 cases.

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Public Health Reports

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

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DIVISION OF SANITARY REPORTS AND STATISTICS

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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UNUSUAL INFESTATION OF A SHIP WITH BLACK WIDOW SPIDERS

Recently the Miami Quarantine Station was requested by a ship's captain to investigate the infestation of his ship by spiders which the members of the crew feared were Black Widow spiders (*Latrodectus mactans*). Examination of 30 specimens collected by the crew confirmed the identity, and a careful inspection of the vessel showed a widely distributed infestation. Numerous adults and egg sacs were located about the hull frames, in the crew's quarters, on the under side of mess tables and benches, in the motor compartments of electrical refrigerators, and beneath clothing lockers. Life boats on the ship's deck likewise housed both spiders and egg sacs. It seems quite remarkable that despite this heavy and unusual infestation, no case of spider bite occurred.

Preparations were promptly made to fumigate the vessel. Hydrocyanic acid gas in the proportion of 4 ounces per 1,000 cubic feet of space was introduced and left in for 3 hours. Immediately after fumigation, 49 dead adult Black Widow spiders were recovered and subsequent search accounted for a total of 174.

Examination of egg sacs provided highly interesting details. Prior to fumigation, one egg sac yielded 76 active small spiders. Five of the numerous egg sacs removed from the vessel after fumigation were dissected and the contents tabulated, as follows:

Sac	*Number of eggs and dead spiderlings*
1	137
2	273
3	150
4	154
5	168

Previous recorded counts of Black Widow spider egg sac contents have shown an average of from 200 to 300 eggs and spiderlings.

Because of the impossibility of guaranteeing freedom from viable eggs or an occasional pregnant female spider which might have escaped a single fumigation, a second identical fumigation was performed 3 weeks later. Following this fumigation, one adult female

was found dead in a nest in which two feebly-moving, small male spiders were located. Careful search by the crew located several live spiders among gasoline drums carried on the deck. No live adults were found below decks but new webs proved that a complete kill had not been accomplished. Rigid inspection was continued and further fumigation will, if necessary, be resorted to.

In all probability Black Widow spiders have been taken aboard ships from time to time but so heavy an infestation does not appear to have been reported heretofore. On this vessel a coincidental heavy infestation with cockroaches provided an ample food supply for a large spider colony, while the complex type of construction that existed offered extensive safe harborage. Apparently safe harborage and plentiful food accounted for a rapid reproduction rate. One well-fed specimen captured before fumigation spun three egg sacs in 11 days.

CONCLUSIONS

Rapid and extensive colonization of the Black Widow spider on shipboard is possible. Once a heavy infestation has occurred, eradication is difficult and can be accomplished only by means of repeated fumigations supplemented by the most rigid inspection.

DISABLING MORBIDITY AMONG EMPLOYEES IN THE SLAUGHTER AND MEAT PACKING INDUSTRY, 1930–34, INCLUSIVE [1]

By Hugh P. Brinton, *Associate Statistician*, Harry E. Seifert, *Assistant Public Health Engineer*, and Elizabeth S. Frasier, *Junior Statistician*, *United States Public Health Service*

This paper presents an analysis of cases of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer among workers in the meat packing industry. The supporting data are drawn from material collected by the Occupational Morbidity and Mortality Study of the National Health Survey, a survey made possible by a grant from the Works Progress Administration in 1935. The data were transcribed from sick benefit organization records of 15,922 members who were employed in 4 meat packing companies during the period 1930–34. The basic data may be summarized as follows:

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[1] From the Division of Industrial Hygiene, National Institute of Health, Washington, D. C.

Readers interested in a description of the industry useful in determining, among other things, the duties connected with the different occupations may consult references *8–11*.

Acknowledgment is made to Dr. W. M. Gafafer for suggestions and criticism

Sex	Number of months of membership	Number of cases of disability	Number of days of disability	Number of deaths
Total	810,678	7,142	233,158	403
	WHITE			
Male	625,666	4,951	164,949	300
Female	71,083	854	28,723	21
	NEGRO			
Male	101,717	1,169	34,013	77
Female	4,971	110	3,544	4
	MEXICAN			
Male	60	------	------	------
Female	60	2	46	------
	OTHER COLORED			
Male	2,792	25	848	------
Female	300	2	30	------
	UNKNOWN			
Male	3,969	28	984	1
Female	60	1	21	------

From the above table it is evident that on the basis of continuous membership during the entire study period of 60 months there would have been 955,320 months of membership, but actually there were 810,678 months, resulting in an average membership of 51 months instead of 60 for the 5 years.

It will be observed further that white males, white females, and Negro males represent 98.5 percent of the total months of membership. For present purposes the analysis will be limited to this large group of the exposed population.

Type of sick benefit organization.—In the four meat packing establishments studied two provided sick benefits through an employees' sick benefit association and two extended aid through a group insurance plan. The two companies having sick benefit associations represented 97.3 percent of the total months of membership. Both of these associations had the same rules and regulations governing operation. The principal provisions were as follows: Voluntary membership (approximately one-seventh of the employees did not join); a required physical examination for all applicants, excluding those found to have serious physical defects unless they agreed not to accept benefits for disabilities presumably caused by such defects. Eligibility for membership was established as soon as an employee was hired. A waiting period of 7 days was required after onset of disability before sick benefits could begin. Two years was the maximum

time benefits could be paid for one illness. Membership ceased immediately at the termination of service with the company, but after lay-offs membership could be retained for 6 months. Benefits were refused for disabilities connected with the improper use of stimulants or narcotics, "immoral practices," venereal diseases, voluntary self-injury, unlawful acts, and fighting. Maternity cases were aided.

Both of the two remaining companies, which were relatively small in size, required 90 days' service before eligibility for membership was established. In one, membership was voluntary, and in the other it was compulsory. Waiting periods were for 7 and 3 days, respectively, while the maximum benefit period for both was 13 weeks for one illness or 52 weeks for different illnesses in any one year.

Standardization of waiting and maximum benefit periods.—The data for all four sick benefit organizations are presented according to certain standard conditions necessitated by the variations in the length of waiting and maximum benefit periods. The method has been described in the preceding papers of this series. The rules of all but one small company conform to the standard waiting period of 7 days, while the maximum benefit period, except for the two small companies, is much longer than the standard of 13 weeks.

Occupational classification.—Within the meat packing industry there is a very wide variety of occupations, many represented by small numbers of workers. Hence, for statistical purposes, it was necessary to classify these occupations into a limited number of groups so that each would have a sufficient exposure. The object was to combine those occupations which represented approximately the same type of work with working environments as nearly alike as possible. The details of these groupings are shown in table 1.

TABLE 1.—*Specific occupations comprising each occupational group, slaughter and meat packing industry*

WHITE MALES

Occupational group	Specific occupation
Office workers	Accountants, auditors, bookkeepers, cashiers, clerks, officials, purchasing agents, and salesmen.
Foremen	Foremen, all departments.
Cold-storage workers	Laborers in cold storage, loaders, luggers, and railmen.
Warm meat workers	Beef pullers, butchers, head splitters, laborers, pork hangers, scrappers, skinners, stickers, trimmers, washers.
Cold meat workers	Boners, knifemen, laborers, luggers, meat cutters, slitters, trimmers, truckers.
Byproducts workers	Beamsters, butter makers, carders, churn men, cookers, fertilizer men, hashers, hide men, hide spreaders and wheelers, kettlemen, laborers in fertilizer and glue departments, laborers in hide department, laborers in lard and butterine departments, lard men, pressmen, pressmen (glue department), refiners, salters (hides), scrubbers, tankmen (glue department), wool driers, wool pullers.
Maintenance workers	Blacksmiths, boilermakers, bricklayers, carpenters and helpers, car repairers, construction laborers, electricians, machinists, mechanical laborers, mechanics, millwrights, oilers, painters, plumbers, steamfitters, tinners and helpers.
Curing workers	Cookers, firemen, laborers in pickle department, laborers in smokehouse, meat salters and laborers, pickle makers, picklemen, smokers, tubmen.
Sausage and casing workers	Casing cleaners, sterilizers, and washers; choppers; cutters; grinders; laborers in casing department; linkers and laborers in sausage department; sausage makers and cookers; stuffers.
All others	Cattle drivers; chauffeurs; chefs; chemists; cleaners; coopers; crate and box makers; dishwashers; doctors; elevator operators; firemen; garage laborers; general laborers; harness and stable hands; inspectors, checkers, and graders (all departments); janitors; laborers in box shop; laborers in cooperage shop; laborers in ice gang; laborers in power plant; packers; policemen; printing-press feeders; printers; scalers; sealers; slicers; stationary engineers; steamers; teamsters; telegraph operators; tin-pail makers; truck and tractor drivers; waiters; watchmen; wrappers; yard laborers.

TABLE 1.—*Specific occupations comprising each occupational group, slaughter and meat packing industry*—Continued

WHITE FEMALES

Occupational group	Specific occupation
Office workers	Bookkeepers, cashiers, clerks.
Sausage and casing workers	Casing cleaners, sterilizers, and washers; cutters; grinders; laborers in casing department; linkers and laborers in sausage department; sausage makers and cookers; stuffers; trimmers.
Scalers, wrappers, and packers	Carton makers, packers, scalers, sealers, wrappers.
All others	Boners; casing workers; general laborers; inspectors, checkers, and graders (all departments); kitchen workers; laborers in lard and butterine departments; office machine operators; seamstresses; stenographers; telephone operators; tin-pail and can stackers; tin-pail machine operators; trimmers; waitresses.

NEGRO MALES

Occupational group	Specific occupation
Warm and cold meat workers	Beef pullers, boners, butchers, head splitters, knifemen, laborers, skinners, trimmers.
Byproducts workers	Beamsters, carders, cookers, fertilizer men, hashers, hide men, hide spreaders and wheelers, kettlemen, laborers in fertilizer and glue departments, laborers in hide department, laborers in lard and butterine departments, lard men, pressmen, pressmen (glue department), refiners, salters (hides), scrubbers, tankmen, wool driers, wool pullers.
Curing workers	Cookers, firemen, laborers in pickle department, laborers in smokehouse, meat salters and laborers, pickle makers, picklemen, smokers, tubmen.
Sausage and casing workers	Casing cleaners, sterilizers, and washers; choppers; cutters; grinders; laborers in casing department; linkers and laborers in sausage department; sausage makers and cookers; stuffers.
All others	Car-shop laborers; cold-storage laborers; coopers; garage laborers; general laborers; inspectors, graders, and checkers (all departments); janitors; maintenance laborers; packers; pipefitters, power-plant laborers, truck drivers; yard laborers.

It will be observed that in most instances the same broad occupational groups or combinations of groups have been used for white males, white females, and Negro males. An exception is scalers, wrappers, and packers, a group among white females which is included under "All others" for white males.

ANALYSIS OF THE DATA

Age distribution by occupational group.—A comparison of the age distribution of gainful workers in the slaughter and packing house industry as given in the United States census of 1930 (*12*, pp. 462–463) with the age distribution of the membership in the present study is shown in the following table:

Age	Percentage distribution			
	Male		Female	
	U. S. census, 1930	Present study	U. S. census, 1930	Present study
Total, known ages	100.0	100.0	100.0	100.0
Under 25	20.5	5.1	47.3	24.2
25–34	28.7	29.7	26.7	38.0
35–44	25.0	34.1	17.2	27.7
45–54	15.9	21.4	6.7	9.1
55–64	7.4	8.8	1.7	.9
65 and over	2.5	.9	.4	.1

For both sexes the greatest difference was for persons under 25 years, which formed a much larger proportion of the total in the census data. At the opposite extreme, there was little difference in

the percentage of persons in the oldest age groups. For example, 9.9 percent of the males according to the census and 9.7 percent of the males in the present study were 55 years and over. Percentages for females 45 years and over were 8.8 and 10.1, respectively. A somewhat smaller percentage for both sexes was observed in the middle age group, 35–44 years, in the census data.

The percentage distribution of months of membership by age for white males, white females, and Negro males is shown, among other things, in table 2. It will be noted that the greatest concentration of white males is in the age group 35–44 years; for white females the maximum number is in the next earlier age group, 25–34 years; while the maximum for Negro males is almost evenly divided between 25–34 and 35–44 years. For white females there is a much larger percentage of membership (63.0 percent) under 35 years of age than for white males (34.6 percent) or Negro males (36.0 percent). Negro males have the smallest percentage under 25 years and white females the smallest percentage 65 years and over.

TABLE 2.—*Percentage distribution of months of membership, by age, sex, and race, according to occupational group, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Occupational group[1]	All known ages (100%)	Age in years as of July 1, 1932					
		Under 25	25–34	35–44	45–54	55–64	65 and over
	WHITE MALES						
All occupations	624,211	5.7	28.9	34.0	21.5	9.0	0.9
Office workers	186,330	6.0	33.2	34.0	18.6	7.5	.7
Foremen	43,709	1.0	15.3	34.7	30.4	17.6	1.0
Cold-storage workers	30,755	9.2	35.3	31.4	18.0	5.6	.5
Warm meat workers	52,521	7.4	28.5	38.0	19.4	6.2	.5
Cold meat workers	81,039	4.8	29.5	36.3	24.0	5.0	.4
Byproducts workers	35,311	6.6	25.5	33.9	25.1	8.3	.6
Maintenance workers	74,364	4.3	24.0	35.0	24.6	10.6	1.5
Curing workers	32,511	5.6	30.7	35.5	19.7	7.6	.9
Sausage and casing workers	33,559	8.3	32.8	34.1	18.7	5.8	.3
All others	104,052	5.6	27.9	30.7	22.1	12.1	1.6
	WHITE FEMALES						
All occupations	70,923	25.7	37.3	27.1	9.0	.8	.1
Office workers	19,495	20.1	50.1	22.0	7.4	.4	--------
Sausage and casing workers	8,820	20.1	23.9	44.2	11.8	--------	--------
Scalers, wrappers, and packers	17,643	33.7	38.9	20.6	5.7	.9	.2
All others	24,959	26.3	31.1	29.6	11.8	1.2	([2])
	NEGRO MALES						
All occupations	101,597	1.2	34.8	34.7	21.3	7.4	.6
Warm and cold meat workers	27,385	1.4	34.3	37.1	20.5	6.0	.7
Byproducts workers	19,737	1.3	38.9	32.9	20.9	5.4	.6
Curing workers	8,812	.8	28.5	42.4	19.8	8.5	([2])
Sausage and casing workers	9,633	1.0	45.7	30.3	17.5	5.5	--------
All others	36,030	1.0	31.5	33.2	23.4	10.0	.9

[1] See table 1.
[2] Less than 0.1 of 1 percent.

Table 2 also shows the distribution of months of membership according to occupational group and age. Among white males membership definitely younger than the average was shown for office workers, cold-storage workers, and sausage and casing workers. In these occupations more than 39 percent of the membership was under 35 years of age. Foremen, with 18.6 percent, and maintenance workers, with 12.1 percent aged 55 years and over, were the occupations with the oldest membership.

Sausage and casing workers composed a young group among Negro as well as among white males. Byproducts workers were a young group among Negro males. There were two occupational groups among white females which had an especially young membership, namely, office workers, with 70.2 percent, and scalers, wrappers, and packers, with 72.6 percent under 35 years of age. In no specific occupational group, either among Negro males or white females, was there as much as 9 percent of the membership 55 years of age and over.

Selected indexes by age group, sex, and color.—From table 3 it will be observed that there is a general uniformity in the relative magnitude of the different indexes with respect to sex and race. Negro males make a more unfavorable showing than white males, except in the average number of days per case. White females have higher indexes than either white males or Negro males. These relationships are found to exist in each of the principal age groups having a relatively large membership.

The annual number of cases per 1,000 persons among white males ranged from 70.7 under 25 years to 171.1 at 65 years of age and older. For white females the rate ranged from 122.5 under 25 years to 202.2 at 45–54 years. The rate for Negro males under 25 years was 91.2, and the rate at 55–64 years was 220.2. Except where the exposure was very limited there was a steady increase with age in the frequency of disabilities.

The annual number of days of disability per person followed a similar trend. There was a more rapid rate of increase with age for white males than for Negro males. Past middle age, the rates for white males and females and Negro males approached each other, while in youth there was wide divergence among these groups.

Beginning with the age group 25–34 years and continuing through 55–64 years Negro males had the shortest average number of days per case. This contrasts with the 2 rates previously given, namely, the number of cases per 1,000 persons and the number of days of disability per person, which for the same age periods showed a higher rate for Negro than for white males. With respect to the length of case the rate of increase with age was comparatively regular except at the extremes of youth and old age. The differences according to sex and race are less than for the other indexes of morbidity.

TABLE 3.—*Summary of selected morbidity indexes for different age groups, according to sex and race, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Sex and race	All ages [1]	Age in years as of July 1, 1932: Under 25	25–34	35–44	45–54	55–64	65 and over
	ANNUAL NUMBER OF CASES PER 1,000 PERSONS [2]						
White male	95.0	70.7	72.3	91.7	107.3	158.7	171.1
White female	144.2	122.5	145.4	146.6	202.2	88.5	----------
Negro male	137.9	91.2	125.3	133.5	139.4	220.2	147.3
	ANNUAL NUMBER OF DAYS OF DISABILITY PER PERSON						
White male	3.16	1.84	2.02	2.79	3.84	6.85	9.35
White female	4.85	3.48	4.65	5.44	7.79	6.57	----------
Negro male	4.01	3.12	3.12	3.59	4.68	7.93	9.58
	AVERAGE NUMBER OF DAYS PER CASE [3]						
White male	33.3	26.1	27.9	30.5	35.8	43.2	54.6
White female	33.6	28.4	32.0	37.1	38.5	74.2	----------
Negro male	29.1	34.2	24.9	26.9	33.6	36.0	65.0
	NUMBER OF CASES BEGINNING DURING 1930–34 INCLUSIVE						
White male	4,951	211	1,087	1,622	1,198	741	81
White female	854	186	321	235	108	4	----------
Negro male	1,169	9	369	392	251	139	8
	NUMBER OF CALENDAR DAYS OF DISABILITY						
White male	164,949	5,500	30,308	49,408	42,942	31,990	4,425
White female	28,723	5,279	10,257	8,729	4,161	297	----------
Negro male	34,013	308	9,202	10,541	8,425	5,005	520
	NUMBER OF DEATHS						
White male	300	5	33	68	85	85	23
White female	21	4	8	6	2	1	----------
Negro male	77	2	18	20	18	17	2
	NUMBER OF PERSON-YEARS OF MEMBERSHIP						
White male	52,138.8	2,986.2	15,026.9	17,693.2	11,168.8	4,669.2	473.3
White female	5,923.6	1,517.9	2,207.0	1,603.2	534.2	45.2	2.8
Negro male	8,476.4	98.7	2,944.8	2,937.2	1,800.1	631.3	54.3

[1] Includes a negligible number of persons of unknown age.

[2] Cases include only those which began during the study period, but days of disability include days for cases which began prior to, as well as during, the study period. This seeming excess of days of disability is compensated in part by the fact that days subsequent to 1934 are not included, even though some cases had not ended or reached 91 days at the close of the study period.

[3] Includes all days of disability during the study period, regardless of when the disability began. Disabilities which reached 91 days or over were arbitrarily terminated at 91 days.

Frequency of disabilities by detailed diagnosis groups.—The annual number of cases per 1,000 for white males, white females, and Negro males for 2 broad age groups and according to detailed diagnosis groups is shown in table 4. Considering white male cases it will be observed that only 3 diagnosis groups show a decrease in the rate for

persons 35 years of age and older. These groups are diseases of the pharynx and tonsils, appendicitis, and other infectious and parasitic diseases, all of which showed similar trends in the soap industry (*6*). Among white females there is a decrease with age for diseases of the pharynx and tonsils, respiratory tuberculosis, diseases of the teeth and gums, ulcer of the stomach or duodenum, diarrhea and enteritis, appendicitis, diseases of the nervous system, and diseases of the skin. Negro males show a decrease for the same diagnosis groups as white males, with the addition of pleurisy and respiratory tuberculosis.

TABLE 4.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, by sex and race, for the age groups under 35 years and 35 years and over, according to detailed diagnosis groups, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis	Annual number of cases per 1,000 persons					
	White males		White females		Negro males	
	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over
Total, all diagnoses	72.1	107.1	136.1	158.8	124.2	145.7
Nonindustrial injuries	12.2	14.2	15.6	15.6	23.7	15.9
Sickness	59.9	92.9	120.5	143.2	100.5	129.8
Respiratory diseases	29.6	36.8	59.3	59.5	53.6	62.9
Diseases of the pharynx and tonsils	7.4	3.8	16.4	6 9	6.9	5.5
Bronchitis, acute and chronic	2.2	3.4	4.3	5.5	5.6	7.0
Other diseases of the upper respiratory tract	3.5	4.9	6.7	9.6	3.6	5.7
Influenza, grippe	13.5	19.5	28.4	32.5	26.0	35.0
Pneumonia, all forms	1.0	2.0	*1.1*	*1.8*	2.6	4.1
Pleurisy	.9	1.4	*.5*	2.3	4.9	3.5
Respiratory tuberculosis	.6	1.5	1.3	*.9*	8.0	1.9
Other respiratory diseases	.5	.3	*.6*	---------	*1.0*	*.2*
Digestive diseases	10.7	14.2	23.6	20.6	13.1	14.7
Diseases of the teeth and gums	.4	.8	*1.1*	*.9*	*1.0*	1.3
Ulcer of the stomach or duodenum	.9	1.2	*.8*	*.5*	*.3*	1.1
Other diseases of the stomach, cancer excepted	.7	1.8	1.3	5.0	3.6	2.2
Diarrhea, enteritis	.7	2.1	3.0	2.7	3.6	4.0
Appendicitis, with or without appendectomy	5.9	3.4	14.2	5.5	2 6	1.5
Hernia	1.1	2.2	---------	---------	*.3*	1.7
Other digestive diseases	1.0	2.7	3.2	6.0	1.7	2.9
Nonrespiratory-nondigestive diseases	18 6	40 4	36 2	59.9	30.9	50 0
Diseases of the circulatory system	2.1	8.2	1.6	6.9	2.6	9.4
Genitourinary diseases	1.4	3.7	5.6	11.0	2.3	5.9
Rheumatic diseases [1]	8.6	12.8	8.5	16.9	15.1	21.0
Diseases of the nervous system [2]	1.3	3.1	3.5	2.7	.7	3.3
Diseases of the skin	1.9	3.0	4.3	4.1	*1.0*	1.9
Other infectious and parasitic diseases	4.8	3.2	5.1	5.9	5.9	3.5
Other nonrespiratory-nondigestive diseases	3.5	6.4	12.6	12.4	3.3	5.0
Ill-defined or unknown diagnoses	1.0	1.5	1.4	3.2	2.9	2.2
Number of person-years of membership	18,013.1	34,004.5	3,724.9	2,185.4	3,043.6	5,422.8

[1] Including acute and chronic rheumatism, lumbago, neuralgia, neuritis, and sciatica.
[2] Exclusive of neuralgia, neuritis, and sciatica.

NOTE.—See footnote 2, table 3.
Italicized rates are based on less than 5 cases.

Among persons under 35 years of age white females showed the highest frequency rate for sickness; however, Negro males had a higher rate for bronchitis, pneumonia, pleurisy, tuberculosis, diarrhea and enteritis, hernia, diseases of the circulatory system, rheumatic diseases, and other infectious and parasitic diseases. White males had a higher rate than white females for pleurisy, ulcer of the stomach or

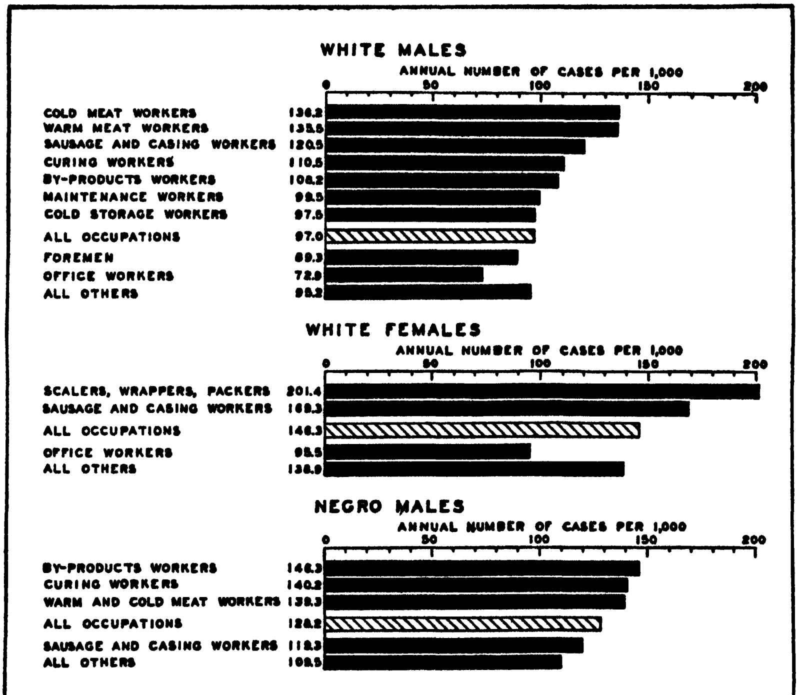

FIGURE 1.—Annual number of cases per 1,000 white males, white females, and Negro males, respectively, of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, according to occupational group, employees in the slaughter and meat packing industry, 1930–34, inclusive. (The rates are age-standardized according to the total white gainfully employed workers in the United States.)

duodenum, hernia, diseases of the circulatory system, and rheumatic diseases.

White females 35 years of age and over also had a higher frequency of sickness than Negro males, although the percentage excess was only one-half as great as in the younger age group. The rate among white males was less than among white females, except for pneumonia, respiratory tuberculosis, ulcer of the stomach or duodenum, hernia, diseases of the circulatory system, and diseases of the nervous system. Nearly the same group of diseases showed a higher frequency among males in an analysis of data from the soap industry (*6*).

Rates by occupation.—The frequency rate, the number of days of disability per person, and the number of days per case are shown ac-

cording to occupational group in table 5. The age-standardized frequency rate for white males, as shown in figure 1, ranges from 72.9 for office workers to 136.2 for cold meat workers. For white females, office workers, with a rate of 95.5, form the occupational group with the lowest frequency, while scalers, wrappers, and packers have the highest rate, 201.4. Among Negro males the rate varies from 146.3 for byproducts workers to 119.3 for sausage and casing workers. Except for office workers, each rate for white females is higher than any rate for white males.

TABLE 5.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, annual number of days of disability per person, and average number of days per case, according to occupational group, sex, and race, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Occupational group [1]	Annual number of cases per 1,000 persons		Annual number of days of disability per person	Average number of days per case	Number of cases beginning during 1930–34, inclusive	Number of calendar days of disability	Number of person-years of membership
	Standardized rate [2]	Crude rate					
	WHITE MALES						
All occupations	97.0	95.0	3.16	33.3	4,951	164,949	52,138.8
Cold meat workers	136.2	129.7	4.39	33.8	336	11,372	2,589.6
Warm meat workers	135.5	128.8	4.14	32.1	565	18,150	4,386.7
Sausage and casing workers	120.5	112.6	3.61	32.1	315	10,104	2,798.1
Curing workers	110.5	106.5	3.45	32.4	289	9,358	2,712 6
Byproducts workers	108.2	106 3	3.81	35.8	314	11,251	2,952.6
Maintenance workers	99.5	100 8	3.53	35.0	626	21,914	6,212.5
Cold-storage workers	97.5	90.3	2.87	31.8	232	7,378	2,568.0
Foremen	89.3	97.5	3.82	39 2	357	13,984	3,661.2
Office workers	72 9	69 5	2.12	30.5	1,082	32,986	15,572.5
All others	95.2	96.1	3.28	34.1	835	28,452	8,685.0
	WHITE FEMALES						
All occupations	146.3	144 2	4.85	33.6	854	28,723	5,923.6
Scalers, wrappers, and packers	201.4	194.3	6.86	35.3	286	10,098	1,472.0
Sausage and casing workers	169 3	170.0	6 60	38.8	125	4,851	735.5
Office workers	95.5	94 5	2.71	28 7	154	4,421	1,629.6
All others	138.9	138.5	4.48	32.4	289	9,353	2,086.5
	NEGRO MALES						
All occupations	128.2	137.9	4.01	29.1	1,160	34,013	8,476.4
Byproducts workers	146.3	155.0	4.25	27.4	255	6,984	1,644.7
Curing workers	140.2	152 5	3 74	24.5	112	2,747	734.3
Warm and cold meat workers	139.3	148.5	4.51	30.3	339	10,283	2,282.1
Sausage and casing workers	119.3	125.8	3.57	28 3	101	2,863	802.8
All others	109.5	120.2	3.70	30.8	362	11,136	3,012.5

[1] See table 1.
[2] Age standardized according to the total gainfully employed workers of specified sex and race in the United States (*12*, p. 117).

NOTE.—See footnotes 2 and 3, table 3.

The annual number of days of disability per person varies by occupation in nearly the same manner as the frequency rate. Among white males the former rate is more favorable than the latter for

TABLE 6.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer for each occupational group, by age, under 35 years and 35 years and over, and ratio of specific occupational group to all occupations, according to broad diagnosis groups, by sex and race, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Occupational group [1]	All sickness and nonindustrial injuries [2]				Nonindustrial injuries				Sickness												Person-years of membership	
									Respiratory diseases				Digestive diseases				Nonrespiratory-nondigestive diseases					
	Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total		Annual number of cases per 1,000 members		Ratio to total			
	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over	Under 35 years	35 years and over
	WHITE MALES																					
All occupations	72.1	107.1	1.00	1.00	12.2	14.2	1.00	1.00	29.6	36.8	1.00	1.00	10.7	14.2	1.00	1.00	18.6	40.4	1.00	1.00	18,013.1	34,004.5
Office workers	52.8	80.0	.73	.75	8.0	8.9	.66	.63	20.8	30.6	.70	.83	11.8	11.4	1.10	.80	11.7	28.0	.63	.69	6,093.9	9,433.6
Foremen	57.4	105.4	.80	.98	8.4	11.8	.69	.83	16.9	31.7	.57	.86	8.5	14.4	.79	1.01	23.6	46.5	1.27	1.15	592.6	3,054.8
Cold-storage workers	78.9	99.8	1.09	.93	11.4	10.5	.93	.74	34.2	37.3	1.16	1.01	9.6	12.6	.90	.89	22.8	38.0	1.23	.94	1,140.1	1,422.8
Warm meat workers	93.5	149.0	1.30	1.39	11.4	18.9	.93	1.33	42.6	48.5	1.44	1.32	9.6	17.8	.90	1.25	28.6	60.6	1.54	1.50	1,572.1	2,804.6
Cold meat workers	113.9	137.1	1.58	1.28	30.4	20.6	2.49	1.45	45.1	51.2	1.52	1.39	11.3	20.0	1.06	1.41	27.1	44.7	1.46	1.11	886.5	1,700.1
Byproducts workers	84.6	117.1	1.17	1.09	15.9	15.5	1.30	1.09	30.7	44.1	1.04	1.20	13.7	14.5	1.28	1.02	23.3	41.0	1.25	1.01	945.1	1,997.5
Maintenance workers	74.2	111.1	1.03	1.04	14.3	17.8	1.17	1.25	27.4	37.1	.93	1.01	8.0	15.5	.75	1.09	21.7	38.9	1.17	.96	1,752.0	4,445.0
Curing workers	79.3	122.3	1.10	1.14	14.2	12.8	1.16	.90	40.7	43.5	1.37	1.18	6.1	15.6	.57	1.10	16.3	49.3	.88	1.22	984.0	1,725.3
Sausage and casing workers	84.4	131.7	1.17	1.23	17.4	23.1	1.43	1.63	32.2	41.9	1.09	1.14	12.2	15.2	1.14	1.07	21.7	48.5	1.17	1.20	1,148.9	1,647.7
All others	75.6	106.7	1.05	1.00	11.4	15.6	.93	1.10	33.1	33.1	1.12	.90	11.4	13.7	1.07	.96	18.6	42.9	1.00	1.06	2,897.9	5,773.1

WHITE FEMALES																						
All occupations	136.1	158.8	1.00	1.00	15.6	15.6	1.00	1.00	59.3	59.5	1.00	1.00	23.6	20.6	1.00	1.00	36.2	59.9	1.00	1.00	3,724.9	2,185.4
Office workers	95.6	93.0	.70	.59	5.3	4.1	.34	.26	50.8	45.5	.86	.76	16.7	14.5	.71	.70	21.9	26.9	.60	.45	1,140.7	483.9
Sausage and casing workers	142.3	191.6	1.05	1.21	12.4	26.7	.79	1.71	52.6	38.8	.89	.66	24.7	41.2	1.05	2.00	52.6	82.5	1.45	1.38	323.2	412.3
Sealers, wrappers, and packers	181.7	228.6	1.34	1.44	19.7	17.4	1.26	1.12	81.5	101.9	1.37	1.71	30.9	17.4	1.31	.84	46.8	84.5	1.29	1.41	1,067.9	402.4
All others	132.4	147.7	.97	.93	22.6	15.8	1.45	1.01	49.5	57.5	.83	.97	23.5	15.8	1.00	.77	36.0	56.4	.99	.94	1,193.1	886.8
NEGRO MALES																						
All occupations	124.2	145.7	1.00	1.00	23.7	15.9	1.00	1.00	53.6	62.9	1.00	1.00	13.1	14.7	1.00	1.00	30.9	50.0	1.00	1.00	3,043.6	5,422.8
Warm and cold meat workers	116.5	166.4	.94	1.14	20.8	16.4	.88	1.03	50.3	78.4	.94	1.25	13.5	15.0	1.03	1.02	31.9	52.5	1.03	1.05	815.5	1,466.6
Byproducts workers	164.7	148.6	1.33	1.02	30.2	13.2	1.27	.83	77.1	59.0	1.44	.94	15.1	18.3	1.15	1.24	39.3	54.0	1.27	1.08	661.9	982.8
Curing workers	143.9	156.1	1.16	1.07	37.1	15.4	1.57	.97	65.0	65.5	1.21	1.04	13.9	11.6	1.06	.79	27.9	59.8	.90	1.20	215.5	518.8
Sausage and casing workers	125.5	126.1	1.01	.87	21.4	16.3	.90	1.03	58.7	39.7	1.10	.63	13.4	16.4	1.02	1.12	26.7	53.7	.86	1.07	374.6	428.2
All others	98.4	130.8	.79	.90	19.5	16.8	.82	1.06	35.9	57.7	.67	.92	11.3	13.3	.86	.90	26.6	43.0	.86	.86	976.1	2,026.4

[1] See table 1.
[2] Includes a negligible number of cases of ill-defined or unknown diagnosis.

NOTE.—See footnote 2, table 3.

curing workers and sausage and casing workers, groups which are relatively young and consequently are likely to have shorter cases. Foremen, who are an older group, have the third from the highest rate per person, although their frequency rate is next to the lowest.

The average number of days per case is strongly influenced by age composition, with the result that among white males maintenance workers and foremen are in an unfavorable position with respect to this measure of disability. Workers in warm and in cold meats, and sausage and casing workers make a more favorable showing for the average number of days per case than for the other two rates.

Frequency of disabilities by occupation, age, and broad diagnosis groups.—Occupational rates are more significant when age and diagnosis are taken into consideration. The magnitude of the available data permitted only the classification of cases falling within each occupational group into age groups under 35 years and 35 years and over and into four broad diagnosis groups. The resulting frequency rates are shown in table 6.

It is of interest to know the diagnosis which is relatively the most unfavorable for a particular occupation. For white males under 35 years of age the highest ratio of specific rate to rate for all occupations was as follows: Nonindustrial injuries among sausage and casing, byproducts, and cold meat workers; respiratory diseases among curing workers; digestive diseases among office workers; and nonrespiratory-nondigestive diseases among foremen, cold-storage, warm meat, and maintenance workers. It would appear that there is an association of high frequency rates for all causes with an excess of nonindustrial injuries, while low rates are associated with an unfavorable amount of digestive diseases. The highest ratios for white males 35 years and over were nonindustrial injuries among sausage and casing, maintenance, and cold meat workers; respiratory diseases among office, cold-storage, and byproducts workers; nonrespiratory-nondigestive diseases among foremen, warm meat, and curing workers. The only occupations which had the same unfavorable diagnosis group at both the older and younger ages were sausage and casing workers, foremen, warm meat workers, and cold meat workers.

Among white females the occupations with the highest ratios of specific to total rate were the same for both age groups, namely, respiratory diseases among office workers and scalers, wrappers, and packers; nonrespiratory-nondigestive diseases among sausage and casing workers.

Negro males under 35 years of age showed the highest ratios for nonindustrial injuries among curing workers, respiratory diseases among byproducts workers and sausage and casing workers, and nonrespiratory-nondigestive diseases among warm and cold meat workers. At 35 years and over the highest ratio of specific rate to rate for all occupa-

tions was for respiratory diseases among warm and cold meat workers, digestive diseases among byproducts and sausage and casing workers, and nonrespiratory-nondigestive diseases among curing workers.

When the magnitude of the frequency rates is examined it is found that respiratory diseases have the highest rate of the 4 diagnosis groups in 15 out of 16 occupations (specific for sex and race) among persons under 35 years of age, and in 8 out of 16 occupations among those 35 years and over. In the remaining occupations nonrespiratory-nondigestive diseases have the highest rates. For persons under 35 years the actual rates among white males range from the lowest to the highest in each diagnosis group as follows: Nonindustrial injuries, 8.0 to 30.4, respiratory diseases, 16.9 to 45.1, digestive diseases, 6.1 to 13.7, and nonrespiratory-nondigestive diseases, 11.7 to 28.6. For persons 35 years and over the range is not so wide, being 8.9 to 23.1 for nonindustrial injuries, 30.6 to 51.2 for respiratory diseases, 11.4 to 20.0 for digestive diseases, and 28.0 to 60.6 for nonrespiratory-nondigestive diseases.

There were five occupations among white males which showed an increase of more than 50 percent in the frequency rate of persons 35 years of age and over as compared with those under 35 years of age. In decreasing order of magnitude these were foremen, 84 percent; warm meat workers, 59 percent; sausage and casing workers, 56 percent; curing workers, 54 percent; and office workers, 52 percent. All but two occupations among white males showed nonrespiratory-nondigestive diseases as having the greatest percentage increase with age. The exceptions were cold meat and maintenance workers, among whom digestive diseases ranked first. Decreases for nonindustrial injuries were revealed in four occupations.

White females showed a much smaller percentage increase in rate with age. Office workers had a decrease of 3 percent in the total rate, and the only diagnosis group with an increase for these workers was nonrespiratory-nondigestive diseases. Decreases were observed in the nonindustrial injury and digestive disease rates among scalers, wrappers, and packers, and in the respiratory disease rate among sausage and casing workers.

Negro males did not show a consistent increase in rate with age. A marked increase occurred only among warm and cold meat workers. In every instance the nonindustrial injury rate was less, respiratory and digestive diseases showed little change, while nonrespiratory-nondigestive diseases increased.

Certain specific diseases were found to be more common in certain occupations. Thus, among others, diseases of the skin, which had a frequency rate of 1.9 for all white males under 35 years, had a rate of 5.1 for workers in warm meat and 5.6 for cold meat workers. All white females 35 years of age and over had a rate of 2.7 for diseases

of the nervous system, while office workers had a rate of 6.2 for this diagnosis. Most prominent among the diseases showing great variation in rate according to occupation is rheumatism. The following table gives the rheumatic rate [2] per 1,000 white males:

Occupational group	Annual number of cases per 1,000 white males		Ratio: Specific occupation to all occupations		Percentage change, under 35 years to 35 years and over
	Under 35 years	35 years and over	Under 35 years	35 years and over	
All groups	3.6	12.8	1.00	1.00	256
Office workers	1.1	5.1	.31	.40	364
Foremen	10.1	8.2	2.81	.64	−19
Cold-storage workers	6.1	14.1	1.69	1.10	131
Warm meat workers	3.8	23.5	1.06	1.84	518
Cold meat workers	3.4	18.8	.94	1.47	453
Byproducts workers	6.3	17.0	1.75	1.33	170
Maintenance workers	4.0	14.0	1.11	1.09	250
Curing workers	7.1	20.9	1.97	1.63	194
Sausage and casing workers	3.5	18.8	.97	1.47	437
All others	3.8	14.0	1.06	1.09	268

Among persons in the younger age group it appears that foremen had a rate more than nine times as great as office workers. High frequency rates for rheumatism occurred among older warm and cold meat workers. These, along with curing workers and sausage and casing workers, had rheumatic disease rates above 18.0 as compared with 12.8 for all occupations. The total for all occupations among Negro males showed higher rates for each age group, namely, 15.1 for persons under 35 years and 21.0 for those 35 years and over. The corresponding rates for warm and cold meat workers combined were 13.5 and 26.6. The latter constituted the maximum rheumatic rate for the older group of Negroes. Among the younger Negroes, byproducts workers were highest, with a rate of 24.2. White females under 35 years had a rate of 3.5, approximately the same as white males, but for the older age group the increase was more sharp, reaching a rate of 16.9. The highest rheumatic rate for any sex or race was 29.1 for white female sausage and casing workers 35 years of age and over.

Environmental conditions.—In addition to the calculation of morbidity rates, by occupation, it is possible to determine the environmental conditions for certain groups. These should be understood to be merely qualitative, since the degree and duration of exposure to such conditions are not known. It is probable that fluctuations in the magnitude of rates for environmental conditions are more definitely limited to influences within the plant than are occupational groups, which are more likely to represent differences in socio-economic status, with consequent variation in rates due to factors operating outside of the plant as well as inside of it.

[2] Rheumatism, in this report, includes acute and chronic rheumatism, lumbago, neuralgia, neuritis, and sciatica.

Table 7 gives disability rates for certain environmental conditions.

TABLE 7.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, annual number of days of disability per person, and average number of days per case, for specified environmental conditions, white MALE and Negro MALE employees in the slaughter and meat packing industry, 1930–34, inclusive*

Environmental conditions	Annual number of cases per 1,000 persons	Annual number of days of disability per person	Average number of days per case	Number of cases beginning during 1930–34, inclusive	Number of calendar days of disability	Number of person-years of membership
	WHITE MALES					
All conditions	95.0	3 16	33.3	4,951	164,949	52,138.8
Close contact with general public	84 3	2 79	33 1	300	9,917	3,560 4
Extreme dry or radiant heat	84.5	3 27	38 7	102	3,950	1,207.8
Extreme cold	94.1	3 05	32.4	149	4,826	1,582.9
Sudden temperature change	100 3	3 06	30 5	122	3,720	1,216.3
High humidity or wet conditions	128.1	4 29	33.5	686	22,952	5,355.8
All others	91 6	3 05	33 3	3,592	119,584	39,215.6
	NEGRO MALES					
All conditions	137 9	4 01	29.1	1,169	34,013	8,476.4
High humidity or wet conditions	141 0	4 02	28 5	303	8,629	2,148 6
All others	136.9	4 01	29.3	866	25,384	6,327.8

NOTE.—See footnotes 2 and 3, table 3.

Among white males the frequency rates varied from 84.3 for those in close contact with the general public to 128.1 for those exposed to high humidity or wet conditions. Sudden temperature change was the only other condition showing a rate greater than 100. Similarly, the annual number of days of disability per person was lowest, 2.79, for close contact with the public and highest, 4.29, for high humidity or wet conditions. The average number of days per case showed a different order of importance, with a low of 30.5 for sudden temperature change and a high of 38.7 for extreme dry or radiant heat. The latter average is influenced by a rate of 51.8 days per case for nonrespiratory-nondigestive diseases.

The frequency rate among Negro males for high humidity or wet conditions is 10.1 percent higher than for white males with the same environment, while the average number of days of disability per person and the average number of days per case are 6.3 and 14.9 percent less, respectively.

Figure 2 shows the ratio of the frequency rate for high humidity or wet conditions to the rate for all environmental conditions for the groups under 35 years of age and 35 years and over. It is evident that the rate for Negro males is little influenced by humid conditions for either age group or any broad diagnosis group. The highest ratio for Negroes (1.33) is for digestive diseases among persons under 35

years of age, yet the lowest ratio (0.74) is for this same diagnosis group among Negro males 35 years of age and over. White males in every instance have a higher rate for persons working under high humidity or wet conditions than for all conditions. This tendency is most marked for both age groups for nonrespiratory-nondigestive diseases, with an excess of rheumatic diseases forming the most important factor.

The two environmental conditions which had the highest rates are shown by broad diagnosis groups for young and old males in table 8. For all diagnoses among white males the excess in the specific rate compared with the rate for all conditions varied between 27 and 38 percent for both age groups of males exposed to high humidity or wet conditions and for the younger males exposed to sudden tempera-

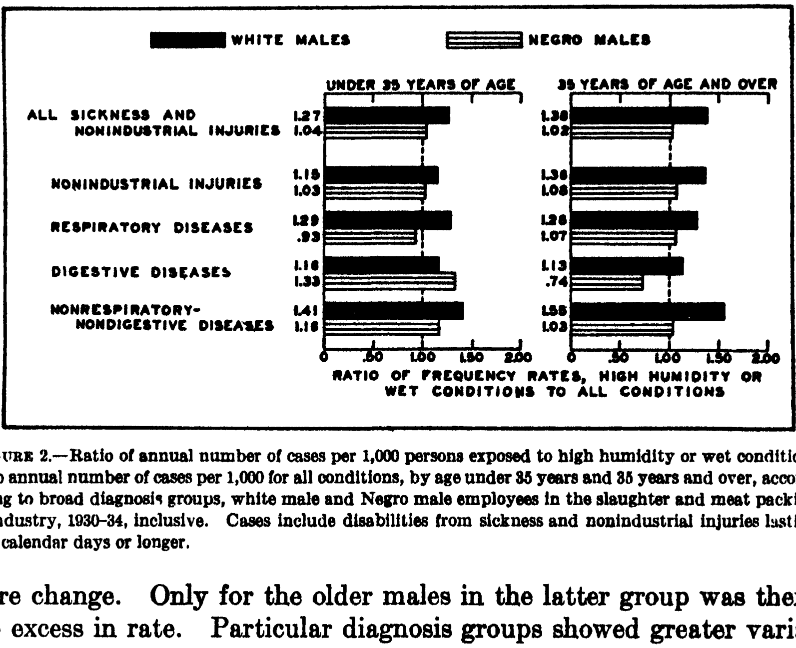

FIGURE 2.—Ratio of annual number of cases per 1,000 persons exposed to high humidity or wet conditions to annual number of cases per 1,000 for all conditions, by age under 35 years and 35 years and over, according to broad diagnosis groups, white male and Negro male employees in the slaughter and meat packing industry, 1930–34, inclusive. Cases include disabilities from sickness and nonindustrial injuries lasting 8 calendar days or longer.

ture change. Only for the older males in the latter group was there no excess in rate. Particular diagnosis groups showed greater variation. Nonrespiratory-nondigestive diseases were decidedly more common among white males exposed to high humidity or wet conditions; the excess amounted to 41 percent when young and 55 percent when older.

No diagnosis group among Negro males exposed to high humidity or wet conditions showed a marked excess in rate over all conditions. Under 35 years of age the ratio of Negro to white rate for high humidity or wet conditions was 1.41. The Negro rate was more than 30 percent in excess for each of the four diagnosis groups among young males, while only in the instance of respiratory diseases was there an excess for Negroes in the older age group.

TABLE 8.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer, for specified environmental conditions, for the age groups under 35 years and 35 years and over, according to broad diagnosis groups, white MALE and Negro MALE employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis group	Annual number of cases per 1,000 persons				
	White males			Negro males	
	All conditions	Sudden temperature change	High humidity or wet conditions	All conditions	High humidity or wet conditions
	UNDER 35 YEARS				
Total, all diagnoses [1]	72.1	94.2	91.9	124.2	129.6
Nonindustrial injuries	12.2	17.3	14.0	23.7	24.3
Respiratory diseases	29.6	30.8	38.1	53.6	49.7
Digestive diseases	10.7	13.4	12.4	13.1	17.4
Nonrespiratory-nondigestive diseases	18.6	32.7	26.3	30.9	35.9
Number of person-years of membership	18,013.1	520.1	1,860.9	3,043.6	864.4
	35 YEARS AND OVER				
Total, all diagnoses [1]	107.1	104.9	147.9	145.7	148.7
Nonindustrial injuries	14.2	17.3	19.3	15.9	17.1
Respiratory diseases	36.8	34.5	47.1	62.9	67.0
Digestive diseases	14.2	12.9	16.1	14.7	10.9
Nonrespiratory-nondigestive diseases	40.4	38.8	62.6	50.0	51.4
Number of person-years of membership	34,004.5	696.2	3,483.0	5,422.8	1,284.2

[1] Includes a negligible number of cases of ill-defined or unknown diagnosis.

NOTE.—See footnote 2, table 3.

Material exposures.—Material exposures are subject to the same limitations as environmental conditions. Degree is difficult to estimate accurately, because some persons may work with certain materials and yet be entirely protected from any possible harmful exposures, while other similar workers may not be safeguarded. Table 9 shows that the exposures for white males having a frequency rate of more than 100.0, in descending order of magnitude, were as follows: Hides and wool, glue and entrails, salt brine, and meats. Most of these groups were comparatively small, with only the last having more than 2,000 person-years of membership. Although these four groups had higher frequency rates and greater annual number of days of disability per person as compared with all exposures, yet the average number of days per case was less in two instances and only slightly greater in the other two exposures.

TABLE 9.—*Frequency of sickness and nonindustrial injuries lasting 8 calendar days or longer, annual number of days of disability per person, and average number of days per case, for specified material exposures, by sex and race, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Material exposure	Annual number of cases per 1,000 persons	Annual number of days of disability per person	Average number of days per case	Number of cases beginning during 1930–34, inclusive	Number of calendar days of disability	Number of person-years of membership
	WHITE MALES					
All exposures	95.0	3.16	33.3	4,951	164,949	52,138.8
Carbon monoxide	94.0	2.75	29.3	134	3,925	1,425.4
Fats, lards, oils	96.8	3.41	35.3	223	7,864	2,303.1
Meats	110.3	3.75	34.0	972	33,043	8,809.5
Salt brine	114.4	3.41	29.8	148	4,415	1,293.9
Glue, entrails	138.9	4.83	34.8	180	6,264	1,295.6
Hides and wool	143.9	4.43	30.7	275	8,454	1,910.5
All others	86.0	2.88	33.4	3,019	100,984	35,100.8
	WHITE FEMALES					
All exposures	144.2	4.85	33.6	854	28,723	5,923.6
Meats	204.5	7.25	35.5	376	13,333	1,838.3
All others	117.0	3.77	32.2	478	15,390	4,085.3
	NEGRO MALES					
All exposures	137.9	4.01	29.1	1,169	34,013	8,476.4
Meats	142.3	4.19	29.4	374	11,001	2,627.8
Glue, entrails	151.6	4.11	27.1	85	2,306	560.7
Hides and wool	188.3	5.05	26.8	136	3,647	722.1
All others	125.7	3.74	29.7	574	17,059	4,565.8

NOTE.—See footnotes 2 and 3, table 3.

The frequency rate for all exposures among Negro males was 45 percent higher than for white males. Again, hides and wool are most unfavorable, and glue and entrails are second. For Negroes the rate for the former is 188.3, which is 31 percent in excess of the white rate for the same group. For glue and entrails the rate is 9 percent in excess of the white rate. For both material exposure groups the Negro cases are of shorter duration than the white. This difference is of such extent that the number of days of disability per person among those exposed to glue and entrails is favorable for Negroes.

Among white females rates for exposures to meats were as follows: Frequency rate, 204.5; days per person, 7.25; and days per case, 35.5. It will be observed that these rates are higher than any material exposure group for white or Negro males.

Frequency by diagnosis group according to selected material exposures is shown in table 10. For white males under 35 years of age the following diagnosis groups were most unfavorable when the rate for the specific material exposure was compared with the rate for all exposures: Nonrespiratory-nondigestive diseases for meats,

respiratory diseases for salt brine and hides and wool, and nonindustrial injuries for glue and entrails. Among white males 35 years of age and over the most unfavorable diagnoses were digestive diseases for meats, respiratory diseases for salt brine, nonrespiratory-nondigestive diseases for hides and wool, and nonindustrial injuries for glue and entrails. Only salt brine, and glue and entrails had the same unfavorable diagnoses at both ages. Digestive diseases were high for persons exposed to glue and entrails and hides and wool, the excess amounting to 56 and 35 percent, respectively, for the younger age group and 46 percent for each in the older age group.

TABLE 10.—*Frequency of sickness and nonindustrial injuries lasting 8 calendar days or longer, by sex and race, for specified material exposures, according to broad diagnosis group and age groups under 35 years and 35 years and over, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Diagnosis group	Annual number of cases per 1,000 persons										
	White males					White females		Negro males			
	All exposures	Meats	Salt brine	Glue, entrails	Hides and wool	All exposures	Meats	All exposures	Meats	Glue, entrails	Hides and wool
	UNDER 35 YEARS										
Total, all diagnoses[1]	72.1	84.5	100.0	93.8	101.0	136.1	191.8	124.2	126.1	149.3	169.3
Nonindustrial injuries	12.2	13.2	9.3	25.0	16.2	15.6	20.5	23.7	21.6	33.2	49.0
Respiratory diseases	29.6	35.3	58.1	35.4	43.3	59.3	85.7	53.6	52.8	63.0	66.8
Digestive diseases	10.7	9.0	7.0	16.7	14.4	23.6	29.8	13.1	14.0	16.6	22.3
Nonrespiratory-nondigestive diseases	18.6	25.8	23.3	16.7	27.1	36.2	54.0	30.9	31.2	29.9	31.2
Number of person-years of membership	18,013.1	3,337.0	429.8	479.5	554.3	3,724.9	1,073.9	3,043.6	928.0	301.5	224.4
	35 YEARS AND OVER										
Total, all diagnoses[1]	107.1	125.9	121.7	165.4	162.7	158.8	222.9	145.7	151.2	154.3	196.9
Nonindustrial injuries	14.2	15.5	12.7	25.7	20.8	15.6	19.7	15.9	16.5	23.1	18.1
Respiratory diseases	36.8	43.6	51.0	49.0	52.0	59.5	89.2	62.9	68.8	57.9	82.4
Digestive diseases	14.2	17.0	16.2	20.8	20.8	20.6	30.1	14.7	14.7	19.3	14.1
Nonrespiratory-nondigestive diseases	40.4	47.4	41.8	67.4	67.6	59.9	80.0	50.0	47.1	54.0	76.3
Number of person-years of membership	34,004.5	5,462.5	862.7	816.1	1,346.2	2,185.4	762.7	5,422.8	1,699.8	259.2	497.7

[1] Includes a negligible number of cases of ill-defined or unknown diagnosis.

NOTE.—See footnote 2, table 3.

White females exposed to meats had rates most in excess for nonrespiratory-nondigestive diseases when young and for respiratory diseases when older.

Negro males under 35 years working with glue and entrails and hides and wool had the greatest excess in rates for nonindustrial injuries; and those working with meats had the greatest excess for digestive

diseases. Among older persons the unfavorable rates were for nonindustrial injuries for glue and entrails, respiratory diseases for meats, and nonrespiratory-nondigestive diseases for hides and wool.

It is interesting to note that high rates for digestive diseases are associated with exposures to glue and entrails for males of both ages and both races. Respiratory diseases are decidedly in excess for all classes of persons 35 years of age and over who are exposed to meats.

Rates by socio-economic class.—Table 11 gives rates by seven principal socio-economic classes. For white males the rate for professional persons and officials is slightly less than that for clerical workers. Semiskilled workers in manufacturing have a rate of 121.5 compared with 104.6 for laborers; this is contrary to the data for the soap industry, where laborers had decidedly the most unfavorable rate (*6*). Possibly the circumstance that semiskilled workers in the slaughter and meat packing industry were engaged chiefly in butchering, trimming, cutting, and boning may have influenced the higher rate. Laborers were widely distributed throughout the entire plant rather than concentrated in those occupations which had high rates.

TABLE 11.—*Frequency of sickness and nonindustrial injuries causing disability lasting 8 calender days or longer, annual number of days of disability per person, and average number of days per case, according to socio-economic class, sex and race, employees in the slaughter and meat packing industry, 1930–34, inclusive*

Socio-economic class	Annual number of cases per 1,000 persons	Annual number of days of disability per person	Average number of days per case	Number of cases beginning during 1930-34, inclusive	Number of calendar days of disability	Number of person-years of membership
	WHITE MALES					
All socio-economic classes	95.0	3.16	33.3	4,951	164.949	52,138.8
Professional persons and officials	66.4	2.14	32.2	142	4,566	2,138.6
Clerical workers	69.7	2.12	30.4	998	30,347	14,327.7
Skilled workers	98.4	3.61	36.7	872	31,976	8,859.8
Semiskilled workers in manufacturing	121.5	3.98	32.7	862	28,225	7,096.7
Other semiskilled workers	107.7	3.73	31.6	178	6,165	1,652.3
Laborers	104.6	3.51	33.6	1,816	60,932	17,355.1
Domestic laborers	117.1	3.86	33.0	83	2,738	708.6
	WHITE FEMALES					
All socio-economic classes	144.2	4.85	33.6	854	28,723	5,923.6
Clerical workers	106.5	2.97	27.9	245	6,843	2,301.5
Semiskilled workers in manufacturing	190.0	6.70	35.2	473	16,673	2,489.4
Laborers	118.8	4.71	39.7	107	4,245	900.7
All other workers	125.0	4.15	33.2	29	962	232.0
	NEGRO MALES					
All socio-economic classes	137.9	4.01	29.1	1,169	34,013	8,476.4
Semiskilled workers in manufacturing	172.9	4.74	27.4	326	8,932	1,885.3
Laborers	130.4	3.82	29.3	776	22,760	5,951.3
All other workers	104.7	3.63	34.6	67	2,320	639.8

NOTE.—See footnotes 2 and, 3 table 3.

Among white females and Negro males, semiskilled workers in manufacturing also had a most unfavorable position, with frequency rates of 190.0 and 172.9, respectively.

Days per case among white males were least for clerical workers and greatest for skilled workers, a difference which would probably be reduced if the rates could be made specific for age. There was greater variation with respect to socio-economic class for white females than for white males. The average number of days per case among white females ranged from 27.9 for clerical workers to 39.7 for laborers.

Figure 3 shows, by sex, the ratio of frequency rates for specified socio-economic classes to the rate for all classes. The same pattern is

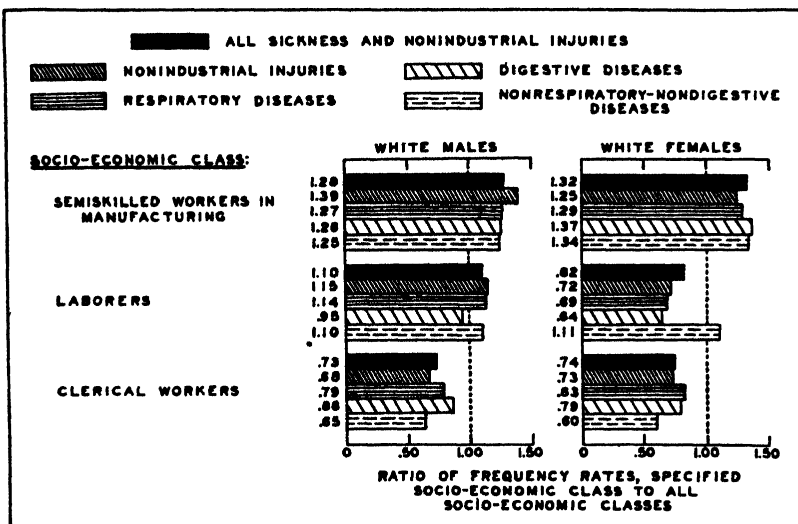

FIGURE 3.—Ratio of annual number of cases per 1,000 persons for specified socio-economic classes to annual number of cases per 1,000 for all socio-economic classes, according to broad diagnosis groups, white male and white female employees in the slaughter and meat packing industry, 1930–34, inclusive. Cases include disabilities from sickness and nonindustrial injuries lasting 8 calendar days or longer.

observed for white males and white females; both have the highest ratios for semiskilled workers in manufacturing, the next to the highest ratios for laborers, and the lowest ratios (below one) for clerical workers. Among white females the ratio decreases for each diagnosis group from semiskilled workers in manufacturing to laborers, but increases in all groups except nonrespiratory-nondigestive diseases when clerical workers are compared with laborers. While white males show a higher rate for laborers than for all socio-economic classes, the reverse is found to be the case for white females, who have a favorable rate for laborers. In the same socio-economic class there is comparatively little variation in the ratio of the various diagnosis groups.

In a previous study (7) it was observed that as the occupations of Negro and white males became more nearly alike the magnitude of the excess in the frequency rate of disabilities among Negroes tended to decrease if not to disappear entirely. This suggested that it was differences in the type of work performed, together with the associated economic status, rather than race per se which produced the unfavorable Negro health record when occupation was not held specific.

SUMMARY

This report deals with sickness and nonindustrial injuries causing disability lasting 8 calendar days or longer among persons engaged in the slaughter and meat packing industry. The annual number of cases per 1,000 was 95.0 for white males, 144.2 for white females, and 137.9 for Negro males,[3] while the annual number of days of disability per person was 3.16, 4.85, and 4.01, respectively.

The occupations which had the highest frequency rates were cold meat workers among white males; scalers, wrappers, and packers among white females; and byproducts workers among Negro males. An excess of respiratory diseases was associated with these high frequency rates. Very excessive rates for rheumatic diseases were found in certain occupations, particularly warm and cold meat workers, sausage and casing workers, and curing workers.

An analysis of environmental conditions revealed that white males exposed to high humidity or wet conditions had the highest rates, with nonrespiratory-nondigestive diseases most in excess. Among white and Negro males the material exposures showing the highest rates were hides and wool, and glue and entrails. In the latter, digestive diseases were much more common than the average for all exposures.

White males and white females, when classified by socio-economic class, showed rates in decreasing order of magnitude as follows: Semiskilled workers in manufacturing, laborers, and clerical workers.

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[3] When standardized for age these rates become 97.0, 146.3, and 128 2, respectively.

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RICKETTSIA DIAPORICA: RECOVERY OF THREE STRAINS FROM *DERMACENTOR ANDERSONI* COLLECTED IN SOUTHEASTERN WYOMING: THEIR IDENTITY WITH MONTANA STRAIN 1 [1]

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In the spring of 1938 three strains of a filter-passing infectious agent were recovered from *Dermacentor andersoni* collected from two areas in Albany County, southeastern Wyoming. Judged by gross pathology, by the morphology and staining reaction of organisms in spleen impression slides, and by cross-immunity tests these strains are identical with each other and also with the Montana strain reported recently by Davis and Cox (*1*).[2]

RECOVERY OF STRAINS

Strain 34.—Twenty-two male and 37 female ticks collected 6 miles southwest of Tie Siding were placed in a feeding capsule on a guinea pig which died afebrile 9 days later. At autopsy all organs appeared grossly normal, but there was extreme emaciation. Meanwhile the partly fed ticks, which were removed after 4 days of feeding, had been

[1] Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Mont.
[2] The 3 strains are designated as 34, 35, and 47 from the last two digits of the original guinea pig numbers.

ground in physiologic saline and injected intraperitoneally into a normal guinea pig. On the first and second days the temperatures were 40 and 40.6° C., respectively, followed by an 8-day afebrile period and a rise on the tenth day to 39.8° C., and 40.2, 40.4, 40.7, and 40° C. on the following 4 days. At this time the animal was sacrificed. The spleen was enlarged three times. Blood in fresh infusion broth yielded no growth. Spleen impression slides from the third transfer guinea pig stained by Giemsa and Machiavello's methods showed numerous intracytoplasmic rickettsia-like organisms. This strain was continued by blood and spleen tissue transfer.

Strain 35.—Twenty-eight male and 23 female ticks collected from the same general area as strain 34 were placed in a feeding capsule. On the seventh and eighth days the guinea pig showed temperatures of 40.4 and 40.2° C., respectively, and was killed for transfer. The spleen was enlarged two times. The guinea pig to which spleen tissue was transferred showed a temperature of 40° C. on the tenth day and remained afebrile until released. The partially fed ticks were injected into a fresh guinea pig. On the tenth to fourteenth days temperatures of 39.8, 40.1, 40.4, 40° C. were registered. On the fourteenth day the guinea pig was sacrificed. The spleen was enlarged five times. This strain was continued by blood and spleen transfers.

Strain 47.—Twenty-seven male and 29 female ticks collected 27 miles south of Laramie, on Fish Creek, were placed in a feeding capsule on a guinea pig which died afebrile on the fourth day. The spleen was enlarged four times. Two guinea pigs receiving portions of the spleen remained afebrile for 13 days and were released. The partially engorged ticks were injected into a fresh guinea pig which showed temperatures of 40, 40.6, and 41° C. on the eighth, ninth, and tenth days. At this time the guinea pig was sacrificed. The spleen was enlarged five times. This strain was continued by spleen-tissue transfer.

FILTRATION

A filtration experiment was performed by passing blood serum from the first transfer guinea pig (strain 35) through a Berkefeld W candle. Each of 2 guinea pigs received 1 cc. of the filtrate intraperitoneally. One showed temperatures of 40.8, 41, 40.8, 41, 40.8° C. on the seventh to eleventh days, respectively, and died on the fourteenth day. The spleen was enlarged about five times. The other showed temperatures of 40.6, 40.6, 40.6, 40.8, and 40.6° C. also on the seventh to eleventh days, respectively, and was subsequently immune to strain 34. Two guinea pigs received 1 cc. each of unfiltered serum. One showed temperatures of 40.6, 40.8, 40.4° C. on the sixth to eighth days, respectively, and died on the sixteenth day. The other showed

temperatures of 40.4, 40.2, 40, 40, and 40° C. on the seventh to twelfth days, respectively, and was subsequently immune to strain 34.

SURVIVAL OF THE INFECTIOUS AGENT FROM ADULT TO ADULT AND TRANSMISSION BY NYMPHS AND ADULTS

Four male and five female *D. andersoni* (Wyoming stock) were placed on a second transfer guinea pig (strain 35). The host guinea pig died on the tenth day when the ticks were only partially engorged. Spleen impression slides stained by Machiavello's method showed numerous rickettsia-like organisms. Thirty-five days later, two of the partially engorged females were placed on a second guinea pig to complete engorgement. This guinea pig showed a typical febrile period and was sacrificed on the tenth day. The spleen was enlarged approximately three times. One-half cc. of spleen suspension in physiologic saline was transferred to each of four guinea pigs. All died showing evidence of intercurrent infections.

Two guinea pigs were infested with larvae from the above females. One hundred and thirty-four engorged larvae were later removed. Neither guinea pig showed signs of infection. After molting, 63 of the above ticks, as nymphs, were placed on a guinea pig, which showed temperatures of 40, 40, 40, and 40.6° C. on the eighth, twelfth, thirteenth, and fourteenth days, respectively. On the fourteenth day the guinea pig was sacrificed. The spleen was enlarged three times.

Transfers by blood were made to two guinea pigs and by spleen to four guinea pigs. One blood-transfer guinea pig died after a febrile period of 6 days (6th to 11th). The other was subsequently immune to strain 34. One of the spleen-transfer guinea pigs died on the sixteenth day. The spleen was enlarged five times. One died the fifth day following immunity test, and two were immune to strain 34.

After molting, the above ticks, as adults, were placed on two guinea pigs. Seven males and 6 engorged females were removed from one guinea pig and 10 males and 14 females from the other. Both guinea pigs showed typical febrile periods and were subsequently immune to a controlled dose of the homologous strain. Parker and Davis have reported similar transmission experiments with the original strain from Montana (*2*).

CROSS-IMMUNITY TESTS

Reciprocal cross-immunity tests, Wyoming strains 34, 35, and 47 (figure 1).—Guinea pigs which had survived infection with one strain were tested in pairs for immunity against each of the other strains, except that only 1 guinea pig was used with strain 47 against strain

35. Equal numbers of controls were used. The 11 test guinea pigs showed complete immunity to the various test doses. Of the 12 controls, 3 died following typical infections and showed spleens enlarged 4, 5, and 6 times, respectively; 1 survived and 8 were used for the continuation of the strains. At the time of transfer the spleens of these 8 were enlarged as follows: 1 guinea pig × 4, 4 × 5, 1 × 7, and 2 × 8.

Strain 47 increased in virulence very rapidly. In one attempt to obtain recoveries each of six guinea pigs was given 0.3 cc. of infectious blood subcutaneously. The blood yielded no growth in fresh infusion broth. All died within 14 days. At autopsy the spleens varied in size from three and one-half to six times normal.

Montana strain 1 and Wyoming strains 34, 35, and 47 (figure 2).—Three guinea pigs (A23756 to A23758) which survived typical infections with the Montana strain each received 1 cc. of spleen suspension from Wyoming strain 34; three others which recovered (A37342, A36097, and A36080) received 0.5 cc. of spleen suspension from Wyoming strain 35; and two (A23762 and A23763) received 1 cc. of spleen suspension from Wyoming strain 47. There were two controls for each strain. Six of these animals remained afebrile; one that received strain 35, and one that received strain 47 each had 1 day of fever. All the controls showed typical febrile periods and one survived. Three that were sacrificed and two that died had spleens enlarged two to four times.

Wyoming strain 35 and the Montana strain (figure 3).—Five guinea pigs (A23218, A23219, A23226, A23227, and A23229), two of which (A23218 and A23219) had received 0.5 cc. of urine from the first transfer guinea pig of the Berkefeld W series, and all of which had survived typical infections with Wyoming strain 35, each received 1 cc. of spleen suspension from the Montana strain. All five guinea pigs remained afebrile over a period of 10 days. Two controls reacted typically. Both died, one on the nineteenth and the other on the thirteenth day, showing spleens enlarged three and one-half and six times, respectively. Three additional guinea pigs (A25545, A25570, and A23781), which had also recovered from typical infections with Wyoming strain 35, each received 1 cc. of spleen suspension from the Montana strain. All three remained afebrile over a period of 10 days. Two controls showed typical febrile periods. One survived; the other died on the thirteenth day showing a spleen enlarged about three and one-half times.

Wyoming strains 34 and 47 and Montana strain (figure 4).—Three guinea pigs (A23733, A25542, and A25567), which had survived typical infections with Wyoming strain 34, each received 1 cc. of spleen suspension from a guinea pig infected with the Montana strain. The three test guinea pigs remained afebrile over a period of 10 days.

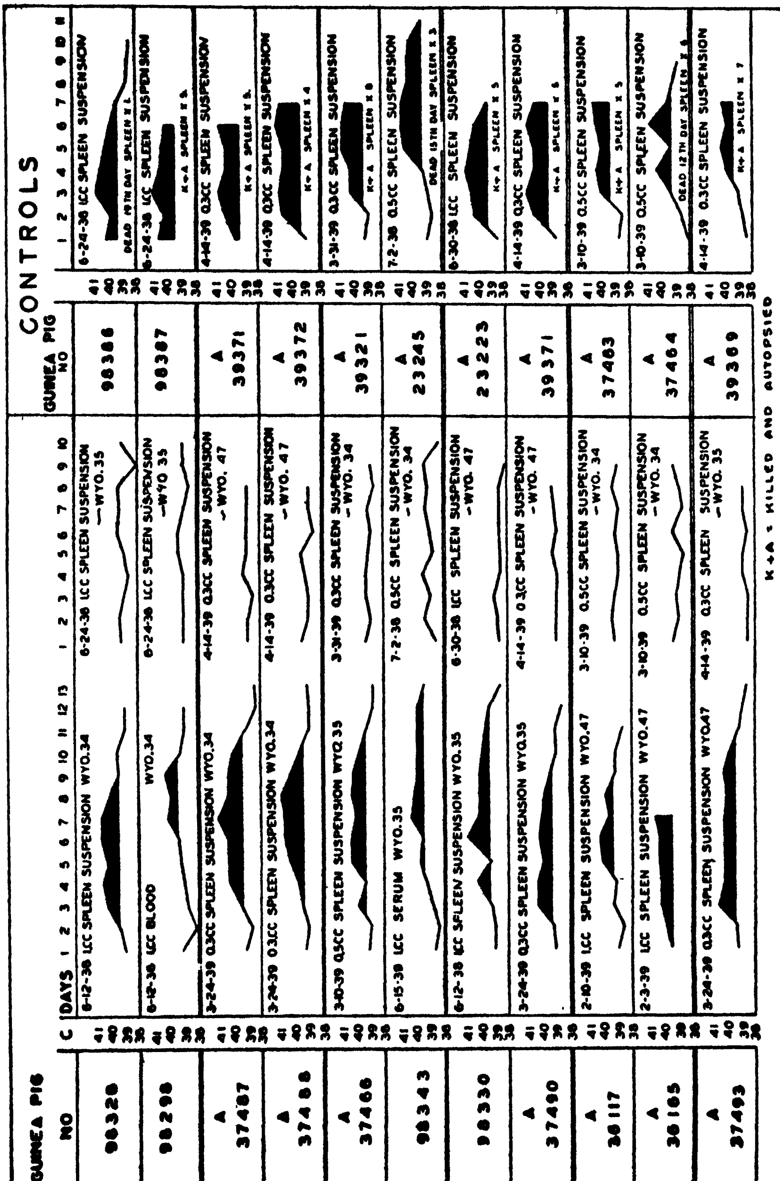

FIGURE 1.—Reciprocal cross-immunity tests, Wyoming strains 34, 35, and 47.

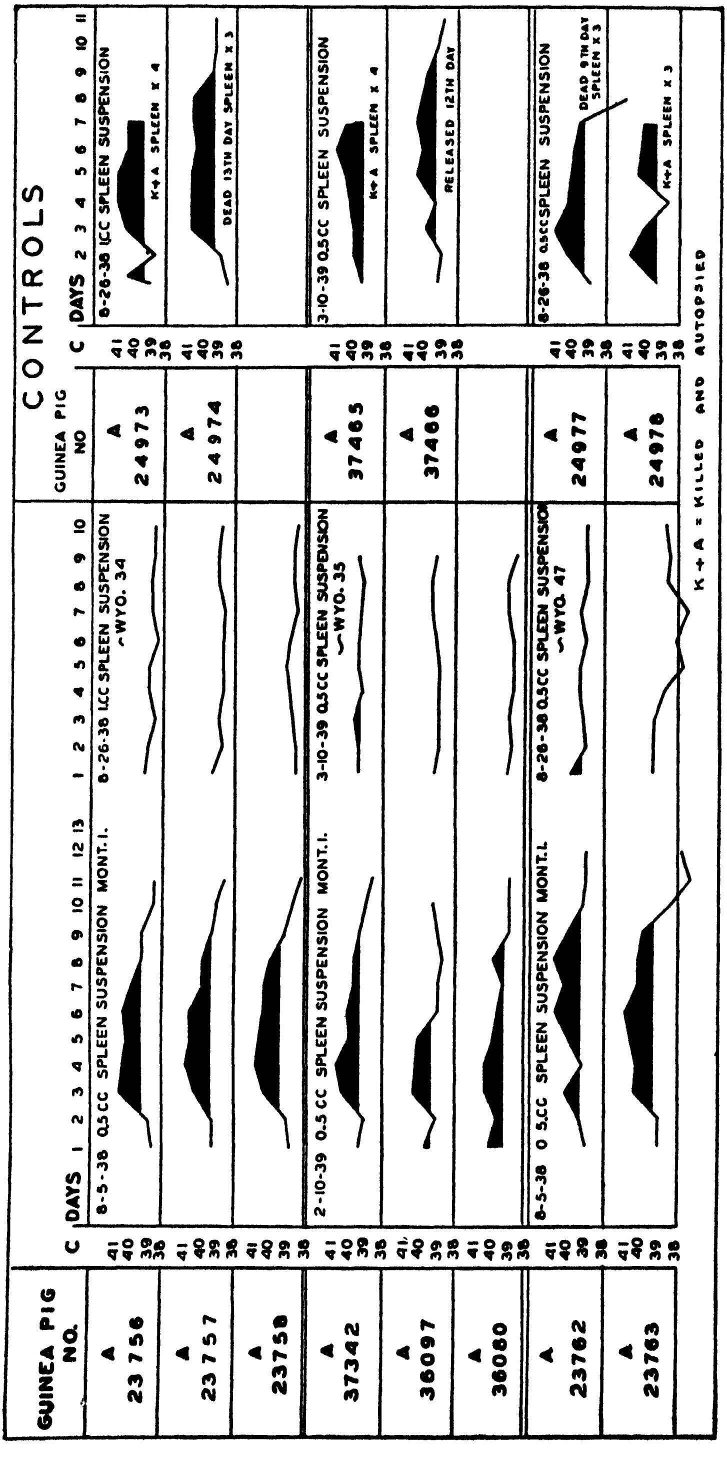

FIGURE 2.—Cross-immunity tests, Montana strain 1 and Wyoming strains 34, 35, and 47.

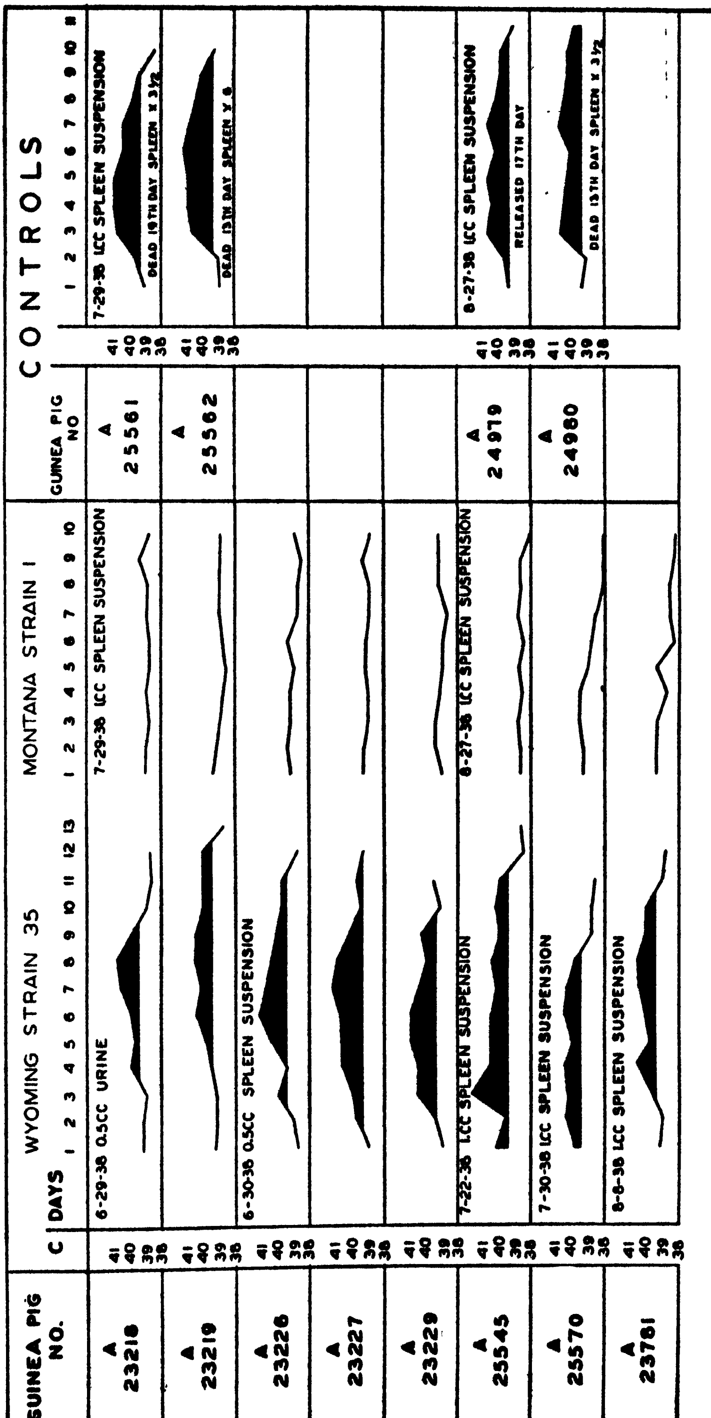

FIGURE 3.—Cross-immunity tests, Wyoming strain 35 and Montana strain 1.

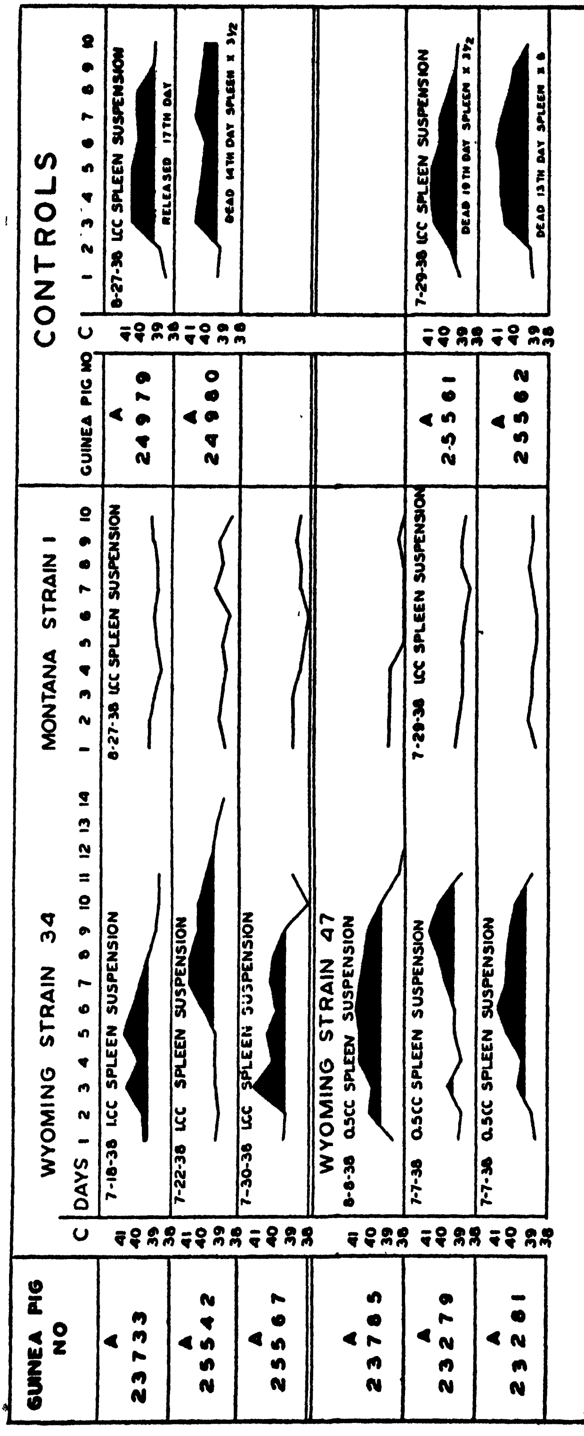

FIGURE 4.—Cross-immunity tests, Wyoming strains 34 and 47, Montana strain 1.

Two controls reacted typically. One was released on the seventeenth day; the other died on the fourteenth day, showing a spleen enlarged about three and one-half times. There was extreme emaciation.

Three guinea pigs (A23785, A23279, and A23281), which had survived typical infections with Wyoming strain 47, each received 1 cc. of spleen suspension from a guinea pig infected with the Montana strain.

The controls for A23785 were the same as for Wyoming strain 34. The controls for A23279 and A23281 were the same as for the first five guinea pigs, Wyoming strain 35 (figure 3). One of the four controls survived, following the usual febrile period, and three died showing the typically enlarged spleens.

SUMMARY

The recovery of three strains of a filter-passing rickettsia-like organism from *Dermacentor andersoni* collected in southeastern Wyoming is reported. The morphologic and tinctorial characteristics of the organisms, the reaction in guinea pigs, the experimental transmission by *D. andersoni* and cross-immunity tests with the original Montana strain of *Rickettsia diaporica* indicate that the three Wyoming strains and the Montana strain are identical.

REFERENCES

(*1*) Davis, Gordon E., and Cox, Herald R.: A filter-passing infectious agent isolated from ticks. Pub. Health Rep., **53**: 2259–2267 (Dec. 30, 1938).
(*2*) Parker, R. R., and Davis, Gordon E.: Transmission by *Dermacentor andersoni*. Pub. Health Rep., **53**: 2267–2270 (Dec. 30, 1938).

COURT DECISION ON PUBLIC HEALTH

Compensation for streptococcus pneumonia denied under workmen's compensation act. (Idaho Supreme Court; *Sonson* v. *Arbogast et al.*, 94 P.2d 672; decided September 28, 1939.) A dairy employee became ill suddenly with streptococcus pneumonia and because of such illness claimed compensation under the workmen's compensation act on account of personal injury resulting from accident arising out of and in the course of his employment. It appeared that the employee had been employed as a "plant man" by the dairy for a little over a month and that as a part of his duties he would work about an hour in the steam room (temperature of about 160°, hotter with live steam) and from there would go into the refrigerator room where the temperature was 34°, working in the latter place from 30 minutes to an hour.

The industrial accident board denied compensation and its order was affirmed by the supreme court. Such court, in sustaining the holding of the board that no accident was shown, said:

* * * The conditions under which Sonson was working were the same throughout the entire period of his employment. He performed his work in the same manner from day to day and was conscious of no mishap, hazard, or fortuitous occurrence nor misadventure to him or on his part. Under such circumstances, to say there was an *accident* would be to distort all definitions of the word and do violence to the common understanding of the language used by the legislature in writing sec. 43-1809, I. C. A. * * *

DEATHS DURING WEEK ENDED NOVEMBER 25, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 25, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	8,002	7,883
Average for 3 prior years	[1] 7,968	
Total deaths, first 47 weeks of year	386,494	380,156
Deaths under 1 year of age	455	518
Average for 3 prior years	[1] 485	
Deaths under 1 year of age, first 47 weeks of year	23,303	24,570
Data from industrial insurance companies:		
Policies in force	66,543,128	68,303,373
Number of death claims	10,541	10,413
Death claims per 1,000 policies in force, annual rate	8.3	8.0
Death claims per 1,000 policies, first 47 weeks of year, annual rate	9.9	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (---) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median
NEW ENG.												
Maine	12	2	45	2	18	8	8	1	229	38	16	16
New Hampshire	10	1	1	0	----	------	------	------	30	3	0	2
Vermont	0	0	0	0	----	------	------	------	590	44	1	7
Massachusetts	13	11	7	7	----	------	------	------	265	225	211	98
Rhode Island	0	0	0	0	----	------	------	------	603	79	0	1
Connecticut	6	2	3	3	6	2	7	6	98	33	73	43
MID. ATL.												
New York	9	22	29	29	[1] 3	[1] 4	[1] 11	[1] 14	149	373	616	397
New Jersey	23	19	12	21	15	13	10	14	14	12	21	31
Pennsylvania [2]	19	37	61	35	----	------	------	------	31	61	48	48
E. NO. CEN.												
Ohio	36	47	62	62	48	62	----	28	35	45	11	65
Indiana	37	25	26	39	19	13	32	32	10	7	13	13
Illinois	29	45	47	47	10	15	10	16	14	22	28	28
Michigan [3]	11	10	21	30	4	4	1	2	141	133	156	94
Wisconsin	4	2	3	4	19	11	48	34	79	45	101	82
W. NO. CEN.												
Minnesota	8	4	2	7	6	3	1	1	118	61	254	49
Iowa	8	4	19	17	2	1	------	1	75	37	49	8
Missouri	19	15	29	29	----	------	21	70	12	9	2	26
North Dakota	0	0	2	2	117	16	17	2	7	1	293	12
South Dakota	8	1	7	1	8	1	8	------	23	3	121	3
Nebraska	15	4	4	7	----	------	10	1	4	1	2	2
Kansas	39	14	6	11	25	9	10	4	215	77	9	9

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median
SO. ATL.												
Delaware [4]	0	0	5	2	----	----	----	----	59	3	3	2
Maryland [2 3]	34	11	3	16	9	3	12	7	15	5	63	38
Dist. of Col	8	1	2	6	8	1	3	1	16	2	2	2
Virginia [4]	71	38	57	55	272	145	128	----	24	13	9	34
West Virginia	40	15	29	29	8	3	8	24	5	2	6	9
North Carolina [2]	92	63	64	64	9	6	1	5	199	136	141	141
South Carolina [2]	90	33	20	12	3,223	1,180	293	239	3	1	7	7
Georgia [2]	40	24	20	22	302	182	63	----	17	10	47	0
Florida	12	4	1	10	18	6	1	3	6	2	7	1
E. SO. CEN.												
Kentucky	28	16	21	21	21	12	16	17	10	6	76	69
Tennessee [2]	23	13	20	42	78	44	40	40	26	15	11	11
Alabama [2]	51	29	43	36	308	175	56	103	19	11	19	18
Mississippi [2 3]	28	11	17	13	----	----	----	----	----	----	----	----
W. SO. CEN.												
Arkansas	40	16	16	17	146	59	94	93	30	12	7	4
Louisiana [3]	41	17	30	25	7	3	11	11	2	1	83	8
Oklahoma	62	31	21	20	100	54	87	87	2	1	22	7
Texas [2]	51	62	53	62	297	359	268	218	14	17	12	12
MOUNTAIN												
Montana	9	1	6	1	821	88	4	8	84	9	210	16
Idaho	20	2	2	2	10	1	----	1	92	9	55	49
Wyoming	22	1	0	0	284	13	----	----	175	8	3	2
Colorado	48	10	13	10	255	53	28	----	197	41	8	10
New Mexico	25	2	5	3	25	2	3	3	0	0	3	31
Arizona	49	4	6	6	797	65	121	56	12	1	2	1
Utah [3]	0	0	0	1	1,033	104	11	----	1,261	127	7	8
PACIFIC												
Washington	9	3	3	3	----	----	----	----	1,449	470	52	52
Oregon	35	7	1	1	119	24	15	18	139	28	7	10
California [3]	32	39	39	45	14	17	63	28	131	160	538	111
Total	29	718	883	883	130	2,756	1,510	1,123	97	2,399	3,425	3,425
48 weeks	18	21,824	27,138	25,748	163	165,468	58,689	112,880	306	363,819	781,008	697,734

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	1	0	0	0	0	0	72	12	18	18
New Hampshire	0	0	0	0	0	0	0	0	41	4	8	14
Vermont	0	0	0	0	0	0	0	0	54	4	9	9
Massachusetts	1.2	1	1	1	2.4	2	0	0	89	76	94	144
Rhode Island	0	0	0	0	0	0	0	0	23	3	12	20
Connecticut	0	0	0	1	0	0	0	0	110	37	43	36
MID. ATL.												
New York	0.4	1	5	6	6	16	3	3	107	268	292	371
New Jersey	4	3	0	1	2.4	2	0	0	198	166	73	90
Pennsylvania [2]	2.5	5	1	2	5	10	0	2	237	467	267	289

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	0.8	1	1	2	2 3	3	0	1	278	361	295	343
Indiana	1.5	1	1	1	1.5	1	0	0	227	153	161	161
Illinois	0	0	0	4	0.7	1	0	6	216	330	354	429
Michigan [3]	0	0	2	2	4	4	0	2	297	281	533	201
Wisconsin	1.8	1	0	0	5	3	0	0	265	151	159	232
W. NO. CEN.												
Minnesota	0	0	1	1	6	3	0	1	267	138	117	131
Iowa	2	1	0	1	20	10	0	0	174	86	71	71
Missouri	0	0	0	3	1 3	1	1	2	85	66	121	121
North Dakota	0	0	0	0	0	0	0	0	299	41	19	45
South Dakota	0	0	0	0	8	1	0	0	210	28	35	35
Nebraska	4	1	0	0	8	2	0	0	50	13	39	39
Kansas	0	0	0	1	0	0	0	1	279	100	145	139
SO. ATL.												
Delaware [4]	0	0	0	0	0	0	0	0	472	24	25	8
Maryland [2 3]	0	0	1	3	0	0	0	0	160	52	17	75
Dist of Col	0	0	0	0	0	0	1	0	129	16	14	14
Virginia [4]	0	0	3	3	1.9	1	0	1	101	54	34	47
West Virginia	2 7	1	4	2	11	4	1	1	185	69	64	91
North Carolina [3]	1 5	1	2	2	0	0	0	1	148	101	59	62
South Carolina [3]	8	3	0	0	0	0	2	0	46	17	13	10
Georgia [2]	0	0	1	1	0	0	1	0	63	38	22	28
Florida	0	0	1	0	0	0	0	0	15	5	0	7
E. SO. CEN.												
Kentucky	3	2	0	1	7	4	0	1	123	71	103	79
Tennessee [3]	0	0	1	2	1.8	1	0	0	113	64	61	61
Alabama [2]	1.8	1	5	2	4	2	2	2	69	39	22	27
Mississippi [2 3]	2.5	1	0	0	2.5	1	2	2	33	13	10	19
W. SO. CEN.												
Arkansas	0	0	0	0	2 5	1	2	1	42	17	22	22
Louisiana [2 3]	0	0	0	0	0	0	0	1	75	31	26	14
Oklahoma	0	0	0	0	0	0	0	0	48	24	42	42
Texas [3]	0.8	1	3	2	2.5	3	0	4	50	60	90	85
MOUNTAIN												
Montana	0	0	1	1	0	0	0	0	290	31	33	33
Idaho	0	0	1	1	71	7	0	1	122	12	17	23
Wyoming	0	0	0	0	22	1	0	0	196	9	8	8
Colorado	0	0	1	1	34	7	0	0	202	42	41	49
New Mexico	12	1	0	0	25	2	0	0	272	22	15	19
Arizona	0	0	1	0	0	0	0	1	49	4	5	17
Utah [3]	0	0	0	0	50	5	0	0	258	26	24	28
PACIFIC												
Washington	0	0	0	2	0	0	0	2	154	50	62	50
Oregon	5	1	1	1	15	3	0	2	119	24	45	45
California [3]	0.8	1	1	2	12	15	2	9	148	180	220	217
Total	1.1	28	40	75	5	116	17	70	154	3,880	3,959	4,624
48 weeks	1.5	1,821	2,666	5,073	6	7,036	1,633	7,091	122	147,380	171,461	204,483

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 2, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases	1934–38, median	Dec. 2, 1939, rate	Dec. 2, 1939, cases	Dec. 3, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	3	2	296	49	56
New Hampshire	0	0	0	0	0	0	0	0	204	26	0
Vermont	0	0	0	0	0	0	0	0	952	71	52
Massachusetts	0	0	0	0	0	0	1	1	115	98	33
Rhode Island	0	0	0	0	0	0	1	1	107	14	30
Connecticut	0	0	0	0	0	0	0	0	202	68	77
MID. ATL.											
New York	0	0	0	0	3	8	8	9	167	416	639
New Jersey	0	0	0	0	5	4	2	4	187	157	361
Pennsylvania [2]	0	0	0	0	9	17	2	13	223	439	382
E. NO. CEN.											
Ohio	2	2	3	2	7	9	3	8	189	246	133
Indiana	6	4	47	5	1	1	5	4	107	72	14
Illinois	0	0	1	2	3	4	6	8	107	164	569
Michigan [3]	4	4	10	1	5	5	3	4	170	161	374
Wisconsin	0	0	3	6	0	0	0	2	248	141	426
W. NO. CEN.											
Minnesota	23	12	9	6	0	0	1	0	95	49	13
Iowa	12	6	16	5	2	1	3	1	24	12	26
Missouri	9	7	18	6	5	4	6	12	12	9	15
North Dakota	0	0	4	4	0	0	0	1	241	33	8
South Dakota	0	0	1	6	0	0	1	0	53	7	2
Nebraska	0	0	1	4	4	1	0	1	15	4	3
Kansas	0	0	1	5	3	1	2	3	14	5	22
SO. ATL.											
Delaware [4]	0	0	0	0	20	1	0	0	295	15	12
Maryland [2, 3]	0	0	0	0	15	5	5	5	216	70	31
Dist. of Col.	0	0	0	0	8	1	0	0	154	19	20
Virginia [4]	0	0	0	0	15	8	6	7	66	35	58
West Virginia	0	0	0	0	10	7	3	4	13	5	42
North Carolina [2]	0	0	0	0	1	1	1	5	67	46	220
South Carolina [2]	0	0	0	0	5	2	0	0	38	14	35
Georgia [2]	2	1	0	0	5	3	5	6	15	9	5
Florida	0	0	0	0	15	5	0	0	12	4	0
E. SO. CEN.											
Kentucky	0	0	0	0	10	6	3	8	155	89	20
Tennessee [2]	0	0	0	1	4	2	1	4	74	42	25
Alabama [2]	0	0	0	0	2	1	1	2	21	12	14
Mississippi [2, 3]	0	0	0	0	8	3	0	7	---	---	---
W. SO. CEN.											
Arkansas	0	0	0	1	17	7	3	4	22	9	29
Louisiana [2]	0	0	0	0	65	27	7	10	94	39	26
Oklahoma	0	0	18	2	8	4	5	14	10	5	4
Texas [2]	1	1	8	1	14	17	9	27	40	48	45
MOUNTAIN											
Montana	0	0	1	23	0	0	1	1	9	1	32
Idaho	0	0	8	1	10	1	1	3	0	0	0
Wyoming	0	0	0	1	22	1	0	0	284	13	3
Colorado	0	0	8	6	5	1	4	4	67	14	75
New Mexico	0	0	1	0	124	10	7	7	297	24	9
Arizona	0	0	0	0	0	0	1	1	37	3	2
Utah [3]	10	1	0	0	0	0	0	0	705	71	10
PACIFIC											
Washington	3	1	5	16	19	6	4	4	108	35	41
Oregon	0	0	1	1	15	3	1	2	119	24	24
California [2]	0	0	0	5	9	11	2	10	127	155	151
Total	2	39	164	164	7	188	117	238	123	3,042	4,168
48 weeks	8	9,161	13,686	6,823	10	12,265	13,715	14,555	137	162,828	194,975

[1] New York City only.
[2] Typhus fever, week ended Dec. 2, 1939, 71 cases as follows: Pennsylvania, 1; Maryland, 1; North Carolina, 5; South Carolina, 1; Georgia, 32; Tennessee, 9; Alabama, 8; Mississippi, 1; Louisiana, 3; Texas, 7; California, 3.
[3] Period ended earlier than Saturday.
[4] Rocky Mountain spotted fever, week ended Dec. 2, 1939, 2 cases, as follows: Delaware, 1; Virginia, 1.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
October 1939										
Indiana	89	10	27	30	2		19	320	24	8
Nevada	0			3	0		0	41	0	0
North Carolina	642	11	58	235	3	5	19	404	1	21
North Dakota	2	10		13	1		2	69	4	1
Oregon	2	40	1	94	3		16	61	1	13
Utah	2	10		21	0		32	45	0	8
Virginia	296	194	26	23	4	8	6	180	0	32

October 1939

	Cases
Chickenpox:	
Indiana	92
Nevada	1
North Carolina	117
North Dakota	93
Oregon	110
Utah	160
Virginia	19
Dysentery:	
North Carolina (bacillary)	3
Oregon (amoebic)	5
Utah (amoebic)	1
Utah (unspecified)	11
Virginia (amoebic)	1
Virginia (bacillary)	167
Encephalitis, epidemic or lethargic:	
Utah	2
German measles:	
North Carolina	13
North Dakota	1
Utah	15
Impetigo contagiosa:	
Oregon	69

October 1939—Continued

	Cases
Mumps:	
Indiana	54
North Dakota	14
Oregon	58
Utah	89
Virginia	41
Rabies in animals:	
Indiana	36
Oregon	1
Rocky Mountain spotted fever:	
Indiana	1
North Carolina	1
Oregon	1
Virginia	1
Septic sore throat:	
Indiana	4
North Carolina	22
Oregon	3
Utah	1
Virginia	92
Scabies:	
Oregon	46
Trachoma:	
Virginia	1

October 1939—Continued

	Cases
Tularaemia:	
Indiana	6
Utah	2
Virginia	5
Typhus fever:	
North Carolina	11
Virginia	1
Undulant fever:	
Indiana	8
North Dakota	1
Oregon	1
Utah	1
Virginia	1
Vincent's infection:	
North Carolina	1
North Dakota	6
Oregon	12
Whooping cough:	
Indiana	155
Nevada	2
North Carolina	260
North Dakota	43
Oregon	83
Utah	178
Virginia	121

WEEKLY REPORTS FROM CITIES

City reports for week ended Nov. 25, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	234	144	39	722	559	1,178	9	334	32	1,097	--------
Current week [1]	115	132	29	374	406	745	1	277	26	725	--------
Maine:											
Portland	0	------	0	10	5	1	0	0	0	2	24
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	6
Nashua	0	------	0	0	0	0	0	0	0	0	11
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	12
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	0	------	2	13	13	18	0	6	0	26	214
Fall River	0	------	0	0	2	0	0	1	0	15	25
Springfield	0	------	0	1	0	1	0	2	0	8	37
Worcester	1	------	0	1	5	3	0	1	0	2	43
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	18
Providence	0	------	0	54	3	1	0	2	0	7	50
Connecticut:											
Bridgeport	0	------	0	2	0	4	0	2	0	0	30
Hartford	0	------	0	1	3	6	0	1	0	16	34
New Haven	0	------	0	0	1	0	0	0	1	0	44
New York:											
Buffalo	0	------	0	0	5	7	0	2	0	7	112
New York	16	7	4	13	69	85	0	71	4	92	1,406
Rochester	0	------	0	0	3	3	0	1	0	11	73
Syracuse	0	------	0	0	0	6	0	2	1	36	41
New Jersey:											
Camden	0	------	0	0	2	6	0	2	0	0	33
Newark	0	------	0	4	7	10	0	2	0	9	84
Trenton	0	------	0	0	2	1	0	1	0	0	27
Pennsylvania:											
Philadelphia	3	------	1	2	20	37	0	19	2	62	465
Pittsburgh	6	3	1	2	16	24	0	8	0	13	147
Reading	0	------	0	0	3	0	0	1	1	0	33
Scranton	0	------	--------	0	------	0	0	------	0	0	--------
Ohio:											
Cincinnati	7	------	0	0	5	11	0	6	0	6	119
Cleveland	1	31	0	3	5	28	0	5	0	83	168
Columbus	3	1	1	1	2	6	0	1	0	3	73
Toledo	0	1	1	13	4	10	0	1	0	12	55
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	9	9
Fort Wayne	1	------	0	0	1	4	0	0	0	0	20
Indianapolis	0	------	0	4	5	20	0	2	0	17	103
Muncie	0	------	0	0	1	1	0	0	0	0	11
South Bend	0	------	0	0	0	3	0	0	0	0	16
Terre Haute	0	------	0	0	5	0	0	1	0	0	19
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	1	2
Chicago	20	14	3	12	26	135	0	21	1	34	681
Elgin	0	------	0	1	1	1	0	0	0	1	11
Moline	0	------	0	2	0	0	0	0	0	1	9
Springfield	1	------	0	0	2	1	0	0	0	1	17
Michigan:											
Detroit	8	------	0	8	17	55	0	10	1	28	247
Flint	0	------	0	0	2	3	0	1	0	9	30
Grand Rapids	0	------	0	1	0	16	0	0	0	1	38
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	4	8
Madison	1	------	0	0	0	0	0	0	0	8	18
Milwaukee	0	1	1	2	4	27	0	1	0	12	85
Racine	0	------	0	0	0	1	0	0	0	3	13
Superior	0	------	0	0	0	2	0	0	0	0	7

[1] Figures for Barre estimated; report not received.

City reports for week ended Nov. 25, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	29	0	0	0	0	0	0	19
Minneapolis	0		1	2	5	28	0	0	0	10	111
St. Paul	0		0	1	6	13	0	0	0	52	78
Iowa:											
Cedar Rapids	0			2		0	0		0	1	
Davenport	0			0		7	0		0	0	
Des Moines	0		0	3	0	16	0	0	0	0	34
Sioux City	0			0		4			0	2	
Waterloo	1			1		4	0		0	0	
Missouri:											
Kansas City	1		0	0	3	9	0	5	0	4	79
St. Joseph	0		0	0	4	3	0	0	0	0	27
St. Louis	6		0	3	9	9	0	5	1	2	224
North Dakota:											
Fargo	0		0	0	0	0	0	0	0	0	8
Grand Forks	0			0		0	0		0	0	
Minot	0		0	1	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	1			0		2	0		0	0	
Sioux Falls	0		0	0	0	6	0	0	0	0	7
Nebraska:											
Omaha	0		0	0	5	0	0	0	1	0	56
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	5
Topeka	0		0	1	3	8	0	0	0	0	12
Wichita	0		0	21	0	4	0	1	0	0	20
Delaware:											
Wilmington	1		0	1	4	5	0	0	0	13	26
Maryland:											
Baltimore	2	3	3	3	12	2	0	9	0	49	205
Cumberland	0		0	0	1	2	0	0	1	0	7
Frederick	0		0	0	0	1	0	0	0	0	4
Dist. of Col.:											
Washington	0		0	4	12	11	0	15	0	10	167
Virginia:											
Lynchburg	0		1	0	1	3	0	1	0	5	18
Norfolk	0	10	0	0	0	1	0	4	0	2	31
Richmond	1		0	6	5	5	0	1	0	0	55
Roanoke	1		0	0	1	2	0	0	0	0	25
West Virginia:											
Charleston	1		0	0	1	1	0	0	0	0	10
Huntington	1			0		0	0		1	0	
Wheeling	0		0	0	1	3	0	0	1	0	23
North Carolina:											
Gastonia	1			0		0	0		0	0	
Raleigh	0		0	0	1	4	0	0	0	0	8
Wilmington	2		0	1	2	1	0	0	0	0	12
Winston-Salem	1		0	0	1	2	0	1	0	0	24
South Carolian:											
Charleston	1	22	1	0	1	0	0	0	0	1	27
Florence	0		0	0	1	0	0	0	0	0	4
Greenville	0		0	0	0	0	0	0	0	1	4
Georgia:											
Atlanta	0	6	1	0	6	7	0	9	0	2	75
Brunswick	0		0	0	0	0	0	0	0	0	3
Savannah	0	13	0	0	2	0	0	1	0	0	34
Florida:											
Miami	0		0	0	2	0	0	0	0	0	33
Tampa	1	1	1	0	1	1	0	1	0	1	22
Kentucky:											
Ashland	0		0	0	0	1	0	0	0	0	5
Covington	0		0	0	1	1	0	1	0	2	17
Lexington	0		0	0	1	0	0	0	0	1	18
Louisville	0	2	0	1	7	11	0	1	0	22	83
Tennessee:											
Knoxville	1	2	0	0	1	11	0	0	1	0	20
Memphis	0	1	1	0	4	6	0	4	0	9	86
Nashville	0	1	1	0	12	1	0	0	0	2	63
Alabama:											
Birmingham	2	12	3	0	7	4	0	4	0	0	65
Mobile	0	8	1	0	1	2	0	0	0	0	18
Montgomery	1	4		0		0	0		0	0	
Arkansas:											
Fort Smith	0	1		0		0	0		0	0	
Little Rock	0		0	1	4	1	0	1	0	0	

City reports for week ended Nov. 25, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Louisiana:											
Lake Charles	0	------	0	0	3	0	0	0	0	0	8
New Orleans	1	------	0	0	15	5	0	10	6	32	180
Shreveport	0	------	0	0	5	0	0	2	0	0	57
Oklahoma:											
Oklahoma City	0	4	0	1	8	2	0	1	0	0	38
Tulsa	0	------	------	0	------	0	0	------	0	0	------
Texas:											
Dallas	5	------	0	0	4	7	0	3	0	1	70
Fort Worth	1	------	0	0	4	15	0	1	0	5	44
Galveston	0	------	0	0	2	3	0	0	0	0	16
Houston	12	------	0	0	4	6	0	8	0	0	86
San Antonio	1	------	0	5	2	1	0	6	0	3	61
Montana:											
Billings	0	1	0	0	0	1	0	0	0	0	6
Great Falls	0	------	0	0	0	1	0	0	0	0	6
Helena	0	------	0	0	0	3	0	0	0	0	5
Missoula	0	------	0	0	1	3	0	0	0	0	5
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	8
Colorado:											
Colorado Springs	0	------	2	0	1	3	0	0	0	0	8
Denver	3	------	0	2	4	3	0	3	1	6	76
Pueblo	1	------	0	1	1	0	0	0	0	0	10
New Mexico:											
Albuquerque	0	------	0	2	1	0	0	4	0	0	8
Utah:											
Salt Lake City	0	------	0	19	1	4	1	0	0	28	25
Washington:											
Seattle	0	------	1	6	2	2	0	2	0	2	88
Spokane	0	------	0	1	0	4	0	0	1	3	33
Tacoma	1	------	0	121	2	3	0	0	1	0	26
Oregon:											
Portland	0	------	0	0	5	5	0	1	0	2	81
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	2	6	1	6	5	25	0	7	1	13	266
Sacramento	1	------	0	0	3	5	0	3	1	0	41
San Francisco	1	1	0	5	7	6	0	8	0	20	160

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
Massachusetts:			
Worcester	0	0	1
New York:			
Buffalo	0	1	1
New York	4	2	1
Rochester	0	0	1
New Jersey:			
Camden	0	0	1
Newark	0	0	1
Pennsylvania:			
Philadelphia	1	0	0
Pittsburgh	0	0	1
Scranton	0	0	2
Minnesota:			
Minneapolis	0	0	2
St. Paul	0	0	1
Iowa:			
Des Moines	0	0	2
District of Columbia:			
Washington	1	0	0
South Carolina:			
Charleston	0	0	1
Louisiana:			
New Orleans	1	0	0
Shreveport	0	1	0
Colorado:			
Denver	1	0	1
Pueblo	0	0	1
California:			
Los Angeles	0	0	3
Sacramento	0	0	1
San Francisco	0	0	2

Encephalitis, epidemic or lethargic.—Cases: New York, 2; Missoula, 1.
Pellagra.—Cases: Savannah, 2.
Rabies in man.—Deaths: Flint, 1.
Typhus fever.—Cases: New York, 1; Charleston, S. C., 2; Atlanta, 1; Mobile, 1; Montgomery, 1; Los Angeles, 2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 18, 1939.—During the week ended November 18, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	3					5
Chickenpox	2	20		251	330	51	48	61	90	853
Diphtheria			1	50	3	9	43	2		108
Dysentery				6						6
Influenza		81			15				4	100
Measles		5	1	180	228	17	2	4	23	460
Mumps				28	45	8			5	86
Pneumonia		12			8	1		1	3	25
Poliomyelitis				2	4					6
Scarlet fever	4	13	11	121	198	17	16	22	16	418
Trachoma						1	1		1	3
Tuberculosis		36	21	66	52	7	4	1		187
Typhoid and paratyphoid fever				20	2	2			1	25
Whooping cough		34	1	151	85	33	46	37	8	395

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of November 24, 1939, pages 2106–2119. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill area.—One rat found on November 7, 1 rat found on November 8, and 1 rat found on November 9, 1939, in Hamakua Mill area, Hamakua District, Island of Hawaii, Hawaii Territory, have been proved positive for plague.

India—Cochin.—During the week ended November 18, 1939, 1 case of plague was reported in Cochin, India.

Smallpox

Iraq—Sulaimaniya Province.—During the week ended November 25, 1939, 19 cases of smallpox were reported in Sulaimaniya Province, Iraq.

Typhus Fever

Portugal—Oporto.—During the week ended October 28, 1939, 1 case of typhus fever was reported in Oporto, Portugal.

Trans-Jordan.—During the week ended November 25, 1939, 1 case of typhus fever was reported in Trans-Jordan.

Yellow Fever

Ivory Coast—Daloa (vicinity of).—On November 27, 1939, 1 case of yellow fever was reported in the vicinity of Daloa, Ivory Coast.

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Public Health Reports

VOLUME 54 DECEMBER 22, 1939 NUMBER 51

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

D VISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chie, of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

November 5–December 2, 1939

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended December 2, 1939, the number reported for the corresponding period in 1938, and the median number for the years 1934–38.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—As might normally be expected, the cases of poliomyelitis dropped about 50 percent during the 4 weeks ended December 2; there were 576 cases reported during the current period, as compared with 1,163 during the preceding 4-week period. All sections of the country contributed to the rise of the incidence, and all sections also participated in the decline.

Since there was no epidemic of poliomyelitis in 1938 the comparison with that year is most unfavorable, and the current incidence (576 cases) represents an increase of approximately 75 percent over the 1934–38 median incidence for this period. The current incidence is the highest since 1931, when the cases for this period numbered 625. While the recent rise will be classed among the minor epidemics of this disease, it has extended over an unusually long period of time, beginning about the first of May (in South Carolina) and maintaining a relatively high level up to and including the current period.

Influenza.—The number of reported cases of influenza rose from approximately 3,400 for the preceding 4 weeks to 7,581 for the 4 weeks ended December 2. The incidence was more than 1.5 times that for the corresponding period in 1938, and more than twice the 1934–38 average incidence for this period. An increase of cases of this disease is normally expected at this season of the year, but in the South Atlantic, South Central, and Mountain regions the current incidence

appeared to be considerably above the average incidence for recent years. In the North Atlantic, North Central, and Pacific regions the incidence was relatively low.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Nov. 5–Dec. 2, 1939, the number for the corresponding period in 1938, and the median number of cases reported for the corresponding period 1934–38 [1]

Division	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median	Current period	1938	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	3,074	3,570	3,804	7,581	4,905	3,721	7,479	10,095	10,095	132	135	279
New England	48	104	59	11	36	24	1,481	924	1,016	3	4	9
Middle Atlantic	333	323	352	74	79	94	1,024	1,710	2,023	29	26	39
East North Central	450	631	636	285	261	384	972	835	835	11	14	35
West North Central	152	313	349	71	146	192	648	2,290	1,901	8	7	21
South Atlantic	1,036	946	1,162	3,838	1,774	1,233	641	1,132	1,132	26	31	49
East South Central	398	435	553	857	468	468	96	198	198	19	81	31
West South Central	447	532	532	1,535	1,400	953	173	347	110	17	8	16
Mountain	67	123	108	766	543	219	552	930	637	9	8	8
Pacific	143	163	214	144	198	224	1,892	1,729	881	10	6	20
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	576	90	332	13,626	14,007	17,052	198	494	494	735	775	1,061
New England	10	4	7	475	632	944	0	0	0	14	24	24
Middle Atlantic	132	25	35	2,644	2,247	2,837	0	0	0	103	93	136
East North Central	72	9	54	4,428	4,919	5,666	59	156	103	77	96	116
West North Central	98	8	40	1,746	1,807	2,246	95	176	176	48	78	94
South Atlantic	43	17	18	1,593	1,227	1,413	3	1	1	151	113	194
East South Central	42	11	31	902	849	758	1	15	9	50	76	123
West South Central	27	9	18	458	681	476	23	57	21	159	168	215
Mountain	55	2	15	485	471	815	9	55	84	32	78	77
Pacific	97	5	63	895	1,174	1,174	8	34	109	101	49	50

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The number of reported cases of diphtheria, 3,074, was at the lowest level for this period in 11 years. Last year 3,250 cases were reported for the corresponding period and the average number of cases for the preceding 5 years was approximately 3,800 cases. In the South Atlantic region the number of cases, 1,036, was about 10 percent above the number reported in 1938, and the Middle Atlantic region reported a slight excess over last year's incidence, but in all regions the incidence was lower than the 1934–38 average for this period.

Measles.—For the country as a whole the number of cases of measles (7,479) was only about 75 percent of the number reported for the corresponding period in 1938, which figure (10,095) also represents the 1934–38 average incidence for this period. In the New England and

Pacific regions the incidence was the highest in recent years, while the East North Central and West South Central reported minor increases over the normal seasonal incidence; in other regions the numbers of cases were comparatively low.

Meningococcus meningitis.—During the current period, 132 cases of meningococcus meningitis were reported, approximately the same incidence as was recorded for the corresponding period in 1938. The average number of cases reported for this period in the years 1934–38 was 279, more than twice the number reported for the current period. With the exception of the year 1934, when 129 cases were reported for this period, the current incidence is the lowest in the 11 years for which these data are available.

Scarlet fever.—The scarlet fever situation was more favorable than it was in 1938 in all sections of the country except the South Atlantic and East South Central regions, where the numbers of cases were approximately 25 percent and 10 percent above last year's figures for this period. In those regions the incidence was also slightly above the 1934–38 median figures for this period, but in all other regions the incidence was low in relation to the experience of recent years. The total number of reported cases (13,626) represents a decline of approximately 25 percent from the preceding 5-year average incidence.

Smallpox.—The smallpox incidence was highly favorable in comparison with recent years. During the current period, 198 cases were reported, compared with 494, 910, and 333 for the corresponding period in 1938, 1937, and 1936, respectively. All sections except the South Atlantic and West South Central participated in the decline.

Typhoid fever.—The incidence of typhoid fever remained relatively low. While the number of cases (735) was only slightly below the number reported for this period in 1938, it was only about 70 percent of the preceding 5-year average figure (1,061) for the corresponding period. In the Middle Atlantic, South Atlantic, and Pacific regions the figures were higher than those for last year, but only one region, the Pacific, reported an excess over the 1934–38 median figure. The excess in the Pacific region seemed to be largely due to a comparatively large number of cases in California, where there were 74 cases reported for the current period as compared with 22, 38, and 33 for the corresponding period in 1938, 1937, and 1936, respectively.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended December 2, based on data received from the Bureau of the Census, was 10.9 per 1,000 inhabitants (annual basis). The current rate is the lowest recorded for this period in 8 years; the average rate for the years 1932–38 was 11.2.

THE RELATION BETWEEN THE TRYPANOCIDAL AND SPIROCHETICIDAL ACTIVITIES OF NEOARSPHENAMINE

V. THE SPIROCHETICIDAL ACTIVITY OF THE SEVERAL AMERICAN BRANDS OF NEOARSPHENAMINE[1]

By T. F. Probey, *Associate Pharmacologist, National Institute of Health, United States Public Health Service*

In previous reports (*1*, *2*, *3*, *4*) on the relation between the trypanocidal and spirocheticidal activities of neoarsphenamine, evidence was presented which indicated that the former test should not be accepted as a reliable index of the therapeutic efficiency in experimental syphilis in rabbits. In these studies it was shown that two brands of neoarsphenamine, representing two types (*5*) of this drug, varying in trypanocidal activity, were remarkably uniform in spirocheticidal activity as determined by the therapeutic dose (*1*), prophylactic dose (*2*), and sterilizing dose (*4*), and showed no significant difference in their ability to influence the reacting substances in sera from cases of syphilis in man (*3*).

The spirocheticidal activity having been determined on only two brands of neoarsphenamine, it was deemed advisable to continue the study to include all American products in order to check their activity in sterilizing or curing rabbits infected with experimental syphilis.

Schamberg and Kolmer, with Madden (*6*), reported the spirocheticidal activity of 18 lots representing 7 brands of neoarsphenamine. In their report each preparation was tested at 10 to 20 mg. per kilogram (2 rabbits at each dose). The report shows that none of the 18 lots was completely spirocheticidal in doses of 15 mg. per kilogram or less; at 20 mg. per kilogram 14 lots were effective.

Voegtlin and Dyer (*7*) reported that the sterilizing efficiency of the arsphenamines was identical in terms of absolute amount of arsenic used, or, in other words, "the sterilizing action of these drugs depends entirely on the amount of arsenic injected, irrespective of whether this arsenic is in the form of arsphenamine, neoarsphenamine, or sulfarsphenamine." They also observed that an essential relationship of the size of the dose to its sterilizing effect is apparent in experimental rabbit syphilis, as indicated by the definite minimum concentration of the arsenical needed to kill all of the parasites in the infected host. The minimal sterilizing dose for neoarsphenamine was recorded as 40 mg. per kilogram, which cured all of 6 animals. The subcurative doses reported are as follows: 24 mg. cured 40 percent of 5 rabbits; 16 mg. cured 50 percent of 6 animals; 2 rabbits given 12 mg. and 1 given 8 mg. were not cured.

Raiziss and Severac (*8*), reporting experiments extending over several years, established the minimal curative dose for neoarsphenamine

[1] Previous papers in this series are listed in references *1*, *2*, *3*, and *4*.

at 40 mg. per kilogram. In one series of 27 lots this dose was effective in 25 lots. These authors recorded agreement with other investigators, noting an exception to the report of Tatum and Cooper (*9*) of 180 mg. per kilogram as the effective dose for neoarsphenamine.

The differences recorded in chemotherapeutic studies in experimental syphilis in rabbits may be due, in part, to the great variation in the time the tissue transfer rabbits are observed. In the technique described by Raiziss and Severac (*10*) the observation time recommended was at least 6 months, whereas Kast, Peterson and Kolmer (*11*) observed their animals for 8 to 12 weeks, and Eagle (*12*) reports 6 to 8 weeks with subtransfers. Bessemans et al. (*13*), in 1935, corroborated the reports of numerous workers that the smaller the graft (number of organisms) the longer the incubation period in experimental syphilis. The longer observation time for the tissue transfer animals appears to be indicated.

EXPERIMENTAL

The technique of infecting the rabbits was the same as that described in previous reports (*4*). Periodic examinations were made to follow the development of the primary lesions before treatment. Only animals which developed a darkfield lesion (positive, typical primary) were used.

Treatment consisted of one intravenous injection of the dose and brand of neoarsphenamine shown in table 1. The control group received no treatment. The progress of the disease and the effect of the treatment are recorded by observation of the evolution of the lesion by darkfield examination and by the tissue-transfer method.

The pretreatment observation period of 2 months allowed the primary lesions to be well developed and the disease to reach definitely the late stage of the active, primary animal infection. The post-treatment observation of approximately 3 months allowed sufficient time for the infection to develop from organisms surviving the treatment. The transfer period observation of 4 months or more permitted the development of the disease even in slow infections following tissue transfers. In addition to the routine examination of the testes, glands, etc., at least 4 darkfield examinations were made on all negative rabbits. Frequently lesions developed in the traumatized area caused by the puncture for darkfield material, and it is believed that had this procedure not been followed the animals in several instances would have been discharged without evidence of the infection.

The evaluation of the sterilizing or curative efficiency of neoarsphenamine was based upon the minimal dose of the drug which cured rabbits with well-developed primary syphilitic lesions. Proof of the cure of the infected rabbits was established by tissue transfers from the popliteal lymph gland and original inoculated testicle.

TABLE 1.—*Spirocheticidal activity of 17 lots of neoarsphenamine representing 7 brands*

Series	Product	Results of tissue transfers										Minimal effective dose (mg.)	Arsenic content (percent)	Observation times		
		Dose (mg. per kg.)								Untreated controls						
		40 mg.		30 mg.		25 mg.		20 mg.								
		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive			Pretreatment	Posttreatment	Transfer period
														Days	*Weeks*	*Weeks*
1-3	E7	7	0	13	0			5	3			30	19.40	69	14	18
	F6	5	0	5	1			4	2			30	19.30	61	12	18
	F7	3	0	5	0			7	1	0	11	30	19.52	62	15	16
4	E8	5	0	4	0			4	2			30	19.20			
	F8	5	0	5	0			4	3			30	19.11			
	D3	5	0	4	0			2	4	0	2	30	18.93	55	12	24
5	E9					3	3	0	3			(?)	19.07			
	D4			3	1	4	1	1	4			30	19.86			
	G4			4	0	4	2	3	2	0	2	30	20.44	76	23	19
6	A4			7	0	5	1	2	5			25	20.16			
	E9			6	0	5	1			0	4	25	19.07	68	13	18
7	E10					10	0					25	19.38			
	F9					8	1					25	21.1			
	A5					9	1			1	3	25	20.70	65	15	25
8	E10			6	2	6	2	0	5			(?)30	19.38			
	F9			7	1	3	5	1	5			30	21.1			
	C5			2	6	3	5	0	6	0	4	(?)	19.60	68	13	25
9	E11	5	1	3	2			0	5			40	19.51			
	H6	6	0	5	2			1	3			40	20.14			
	C5	5	1	4	2			1	4			40	19.60			
	C6	5	1	1	5			0	4	0	2	40	19.45	73	11	20
1-9		51	3	84	22	60	22	35	61	1	28					
Percent		94.4		79.2		73.2		36.4			96.5					

The spirocheticidal activity of 17 lots of neoarsphenamine, representing the 7 American brands, as determined by the sterilizing or curative efficiency in experimental syphilis in rabbits, is recorded. The report consists of 9 independent tests, each requiring approximately 1 year to complete. In each test brand E was used as the control product (E–7, 8, 9, 10, 11) thereby establishing a basis for comparison for the entire series.

Series 1 to 3, inclusive, formed the basis of the report of the sterilizing efficiency of neoarsphenamine and have been previously described (*4*). The minimal curative dose was placed at 30 mg. per kilogram for both brands of neoarsphenamine. It was noted that one brand (F6) failed to cure 1 of 6 rabbits at that dose but, on the other hand, brand F was more effective at 20 mg. than was product E.

The Kahn reaction, being negative in latent experimental syphilis in rabbits, was found to be of little value as a criterion of the curative efficiency of neoarsphenamine in experimental syphilis in rabbits (*4*) and was discontinued after series 3.

Series 4 to 9, inclusive, represent study of the remaining American brands not previously considered.

With results available of the first 6 series, which showed that 25 mg. per kilogram cured approximately 73 percent of the infected rabbits, an attempt was made in series 7 to replace the 3-dose method with a 1-dose method utilizing the 25 mg. dose. The 1-dose method has been successfully applied to the trypanocidal test by Morrell, Chapman, and Allmark (*14*). After the one attempt the method was abandoned as it was apparent that information was quite inadequate. In this connection it appeared that one factor which should be investigated was the possible effect of the virulence of the organism on the efficiency of the drug.

In this study the minimal effective dose varied, being 25 mg. per kilogram in series 6 and 7, 40 mg. in series 9, and 30 mg. in all others with the exception of Group 8, for which the curative dose was not definitely determined. It is apparent that each test must be considered independently and compared with the control product, brand E, of each series; no significant difference will then be noted in the sterilizing power of the 17 lots of neoarsphenamine studied.

It is suggested that the variation in the effective dose may be due to changes in the virulence of the organism (*15*) referred to above rather than to differences in the therapeutic activity of the drug. In support of this observation the results obtained with E–9 and E–10 are offered for consideration. E–9 in series 5 was ineffective at 25 mg. (50 percent), and in series 6 the minimal effective dose was found to be 25 mg.; E–10 in series 7 was effective at 25 mg. (minimal effective dose), whereas in the next series this lot was ineffective at a higher dose of 30 mg.

In the composite protocol of the 9 series the minimal effective dose may be placed at 40 mg. per kilogram, since this dose cured 94 percent of 54 rabbits. The results at lower dosage are as follows: 30 mg. cured 79 percent of 106 rabbits, 25 mg. cured 73 percent of 82 rabbits, and 20 mg. cured 36 percent of 96 rabbits.

The results recorded in this study are in agreement with the observation of Voegtlin and Dyer (*7*) that the sterilizing action of the arsphenamines depends upon the amount of arsenic injected. The neoarsphenamine of all brands is reasonably uniform in its arsenic content, varying from 18.93 percent (D–3) to a maximum of 21.10 percent (F–9). All neoarsphenamine would therefore be expected to be of approximate sterilizing power if the Voegtlin-Dyer thesis, as it applies to neoarsphenamine, is correct, and according to these results it is.

Also confirming the Voegtlin-Dyer observation (*7*), the essential relation between dose and sterilizing effect of the arsphenamines in experimental syphilis is recorded in this study by the progressive increase in the percentage of rabbits cured of experimental infection which followed the increased dosage.

CONCLUSIONS

The minimal effective dose of neoarsphenamine in experimental syphilis may vary from test to test, due probably to the variable factors in the experimental infection to which the virulence of the organism may contribute rather than to differences in the curative activity of the drug.

Seventeen lots of neoarsphenamine, representing seven American brands, are recorded as being uniformly active in curing experimental syphilis in rabbits with one treatment late in the active stage of the disease.

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HEMORRHAGIC ADRENAL NECROSIS IN RATS ON DEFICIENT DIETS

By Floyd S. Daft, *Biochemist*, and W. H. Sebrell, *Surgeon, National Institute of Health, United States Public Health Service*

György, Goldblatt, Miller, and Fulton (*1*) have described a condition in rats on a deficient diet, characterized by granulocytopenia, anemia, and purpura, which they designated "panmyelophthisis." They noted that 24 out of 72 rats with this disease also had hemorrhagic adrenals. Panmyelophthisis could neither be prevented nor cured by a fuller's earth filtrate of a rice bran extract supposed to be rich in the filtrate factor, but it was cured by the watery yeast extract represented by Peter's eluate. György (*2*) later reported its prevention with nicotinic acid.

Oleson, Bird, Elvehjem, and Hart (*3*) have described a similar condition in rats characterized by purpura of the paws and nosebleed, but they did not study the blood and therefore were unable to state whether the condition was identical with panmyelophthisis. The adrenals apparently were not studied. They reported that nicotinic acid did not prevent the condition, and expressed the opinion that the dietary factor concerned is adsorbed on fuller's earth along with vitamin B_6 since the condition appeared more frequently when crys-

talline B_6 was fed than when the fuller's earth eluate was used as a supplement.

We have frequently encountered hemorrhagic necrosis of the adrenals in rats on diets deficient in various members of the vitamin B complex during the past few years, yet we have not seen the symptoms of panmyelophthisis described by György and his associates (*1*) nor the purpura mentioned by Oleson and his associates (*3*). The experiments herein reported suggest that the hemorrhagic necrosis of the adrenals may be due to a dietary deficiency other than that concerned in panmyelophthisis.

Young albino rats at weaning were given diet 461, which is composed of leached and alcohol extracted casein, 18 percent; cod liver oil, 2 percent; Wesson oil, 3 percent; Osborne and Mendel salt mixture, 4 percent; and sucrose, 73 percent. In addition, all animals began a daily supplement of 20 gamma of riboflavin and 15 gamma of thiamin chloride approximately 2 weeks from the beginning of the experiment when they had stopped gaining weight. Some, but not all, of the rats in the various groups were litter mates.

Because of the difficulty of being certain of the presence or absence of adrenal hemorrhagic necrosis by gross examinations alone, only animals on which the diagnosis was confirmed by histological examination [1] are included in this report.

Eight rats on the above regimen and 4 rats given an additional daily supplement of 1 mg. of nicotinic acid all died in from 30 to 113 days. Four at death had the skin lesions typical of vitamin B_6 deficiency. The remaining 8 died before the usual time of development of these lesions; 6 of the 12 rats had hemorrhagic adrenal necrosis at autopsy, and the adrenals of 1 other animal showed histological evidence of damage followed by repair. According to Dr. Nelson's observations, the bone marrow of 1 rat with normal adrenals showed severe hypoplasia similar to that described by György et al. (*1*) in panmyelophthisis.

Five rats on the basal ration plus flavin, thiamin, and nicotinic acid were later given a vitamin B_6 concentrate.[2] In 3 the typical skin lesions of vitamin B_6 deficiency were present when the administration of the concentrate was started. All animals were dead after 11 to 29 days of treatment, although the B_6 acrodynia had partially or completely receded at the time of death. All of the rats had nosebleed and 4 had a sticky exudate on the eyelids. Three of the 5 rats had hemorrhagic adrenal necrosis at autopsy.

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[1] All of the histological studies were carried out by Dr. A. A. Nelson, whose observations are included in an accompanying paper in this issue.

[2] The method of Lepkovsky (J. Biol. Chem., 124: 125 (1938)) for the isolation of crystalline B_6 was followed. The concentrate was tested just before and just after the precipitation of the phosphotungstate. Burroughs Wellcome & Co. Ryzamin B was the starting material.

Four rats on the basic diet plus flavin and thiamin were given a daily supplement of 10 gamma of crystalline B_6 after the skin lesions of B_6 deficiency had developed. One also was given a daily supplement of 1 mg. of nicotinic acid. The skin lesions of B_6 deficiency completely disappeared, but all 4 rats died after 25 to 32 days of vitamin B_6 administration. All had nosebleed and 2 had a sticky exudate on the eyelids. Hemorrhagic adrenal necrosis was found in all.

Nine rats on the basic diet plus flavin, thiamin, and nicotinic acid were later given a crude fuller's earth filtrate.[3] This was started after the skin lesions of vitamin B_6 deficiency appeared in 7 of the animals. Similar skin lesions appeared in the remaining 2 animals while receiving the fuller's earth filtrate. Four died showing advanced skin lesions of vitamin B_6 deficiency. The remaining 5 were killed after 12 to 70 days on the fuller's earth filtrate. In 3 of these animals the skin lesions of vitamin B_6 deficiency had subsided.[4] None had symptoms of nosebleed or sticky exudate on the eyelids. No hemorrhagic adrenal necrosis was found in any of the 9 rats. According to Dr. Nelson's report, 2 of these animals showed histological evidence of previous adrenal damage followed by repair.

The relatively small number of animals presented here represents a certain amount of selection because only those histologically examined are included, and the figures therefore should not be interpreted as indicating true percentages of animals with hemorrhagic necrosis of the adrenals in each group.

It seems unlikely that the hemorrhagic adrenal necrosis represents part of the syndrome described by György et al. (*1*) or by Oleson et al. (*3*). Blood examinations made less than 24 hours before death on 3 of the rats with extensive adrenal lesions gave normal red and white cell counts in 2 rats. In the third animal the red blood cell count was 3,500,000 and the white cell count 2,150, but there were 64 percent granulocytes. Both György et al. (*1*) and Oleson et al. (*3*) note the occurrence of purpura or hemorrhage into the paws. None of our rats showed any evidence of this condition. Although 24 out of 72 of György's rats with panmyelophthisis also had hemorrhagic adrenal necrosis, 48 did not. According to Dr. Nelson's observation, the only rat in our whole series with bone marrow changes typical of panmyelophthisis had normal adrenals, and the chances are rather small that all of our rats with hemorrhagic necrotic adrenals would have died without showing any evidence of panmyelophthisis if the two conditions are due to a deficiency in the same dietary factor.

[3] Burroughs Wellcome Ryzamin B or Eli Lilly Liver Extract No. 343 was treated with fuller's earth in aqueous solution according to the procedure of Lepkovsky, Jukes, and Krause (J. Biol Chem., 115: 557 (1936)) for the separation of factor 1 from factor 2.

[4] The fuller's earth did not completely remove the vitamin B_6 from this preparation.

SUMMARY

We have observed extensive hemorrhagic necrosis of the adrenal glands of rats on deficient diets. The condition appears to be due most probably to a deficiency in some unidentified dietary factor. These animals have not shown the purpura or bone marrow changes reported by other investigators in rats on diets deficient in various factors of the vitamin B complex.

It appears unlikely that the hemorrhagic adrenal necrosis is part of the syndrome described as panmyelophthisis, although there is not sufficient evidence to prove conclusively that the two conditions are entirely unrelated.

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HEMORRHAGIC CORTICAL NECROSIS OF ADRENALS IN RATS ON DEFICIENT DIETS [1]

By A. A. NELSON, *Associate Medical Pathologist, United States Public Health Service*

The pathological material studied and reported in this paper was obtained from the 30 rats described in the paper by Daft and Sebrell (*1*), and from 44 other rats maintained on a variety of diets deficient in some member of the vitamin B complex; both groups showed adrenal and other lesions of the same character. These groups represent the rats selected for histological study out of a larger number of experimental animals, and it must, therefore, be stated that they may not represent the true incidence of the lesions.

Tissues were fixed in Orth's fluid and stained by alum hematoxylin-Romanowsky and iron hematoxylin-Van Gieson methods.

GROSS PATHOLOGICAL CHANGES

The more marked degrees of hemorrhagic necrosis of the adrenal cortex could easily be seen grossly; the adrenals were swollen and dark; minor degrees of this lesion were difficult to differentiate grossly from simple congestion. The lungs often showed small whitish spots of pneumonic consolidation, and the pleural cavities sometimes contained a little free fluid; the peritoneal cavity did not contain fluid. Blood was seen in the gastrointestinal tract in 5 animals. The other viscera showed no gross lesions. Slight brownish blood staining around

[1] From the Division of Pathology, National Institute of Health.

the nostrils was seen in about one-fourth of the rats. The rat acrodynia characteristic of B_6 deficiency was also seen in about one-fourth of the animals, of which none were in the group given crystalline B_6 supplement.

MICROSCOPIC CHANGES IN ADRENALS

Adrenal lesions were found in 44 of the 74 rats, as shown in figures 1 to 4 and in the following table.

TABLE 1.—*Adrenal lesions*

Type of lesion	Number showing cortical lesion	Number of lesions showing calcification	Number of lesions showing pigmented macrophages	Number showing regenerative cortical cells
Very marked hemorrhagic cortical necrosis	16	6	2	6
Marked hemorrhagic cortical necrosis	6	3	3	1
Moderate hemorrhagic cortical necrosis	6	1	2	1
Slight hemorrhagic cortical necrosis	4	1	1	0
Marked cortical calcification and fibrosis	2	2	2	0
Collagenous zone at corticomedullary junction	10	0	7	0
Total	44	13	17	8

The hemorrhagic cortical necrosis tended to involve the inner cortex most, and when it was severe (figs. 1–3) only the outer one-third to one-fifth or even less of the cortex was left. Calcification of the necrotic areas tended to involve their peripheries, and when present was usually marked (fig. 1). The collagenous zone (fig. 4) at the corticomedullary junction or in the inner cortex, usually containing moderate numbers of macrophages loaded with hemosiderin, was interpreted as a reparative process after less marked degrees of cortical necrosis. In the adrenals with necrosis, there were often variable, usually slight, degrees of fibroblastic proliferation and collagenization in the necrotic areas. The two adrenals showing marked focal cortical calcification and fibrosis, without necrosis, had undoubtedly undergone necrosis in the past. It is probable that a few adrenals showing small foci of necrosis were missed because only one section of each adrenal was made. One adrenal of each pair was used for paraffin sections and the other for fat stains; lesions were fairly similar in extent within each pair.

In adrenals with cortical necrosis, the remaining cortical cells sometimes differed in appearance from the usual cells in that region; they were smaller, darker, and less regular in outline, and gave the impression that they were regenerating cells. Only the more marked degrees of this change were noted in the table.

The medulla was uninvolved, even in the presence of practically complete hemorrhagic cortical necrosis, except in 2 animals. Here some of the medullary capillaries were thrombosed, but the medullary cells appeared unaffected.

Sudan and Nile blue stains for fat and examination under polarized light were done in 60 of the 74 rats. Space does not permit presentation of the detailed findings, but, in general, the nonnecrotic adrenal cortices showed from moderate to large amounts of sudanophilic material, with the greatest amount toward the periphery, while with Nile blue there was a similar amount and distribution of blue-staining material. Small to moderate and occasionally large amounts of doubly refractile spicular material were present, again with the most in the peripheral cortex. In the necrotic adrenals, the fat distribution was not markedly changed, and in general was moderately reduced in amount; no adrenal was fat free. In the necrotic areas, the fat usually stained violet to pink, instead of blue, with Nile blue.

MICROSCOPIC CHANGES IN OTHER ORGANS

These were greatest in the lungs, testes, and skin; in the lungs and testes there was a slight tendency for the most marked lesions to occur in the rats showing the most adrenal necrosis. The liver, kidney, spleen, bone marrow, gastrointestinal tract, pancreas, heart, eye, lower jaw region, and brain showed infrequent, minor, or no lesions.

Lungs.—The lungs were examined microscopically in 71 of the 74 animals. Pneumonic processes were present, as shown in table 2. In the lungs with the greatest involvement there was usually a focal bronchopneumonia with predominantly polymorphonuclear cellular exudate, while in some of the less involved lungs there was also interstitial involvement, with more mononuclear leucocytes in the exudate.

TABLE 2.—*Lesions in lungs*

Adrenal lesion	Number of animals	Pneumonia			Lung not examined
		Marked	Slight to moderate	Little or none	
Severe cortical necrosis	22	4	5	12	1
Less marked cortical necrosis	10	1	1	8	0
Cortical calcification and fibrosis	2	0	2	0	0
Collagenous zone at corticomedullary junction	10	2	1	6	1
No adrenal lesion; animal died	21	2	5	13	1
No adrenal lesion; animal killed	9	1	0	8	0
Total	74	10	14	47	3

Testes.—The testes were examined in 29 animals. In general, there was a marked reduction in spermatogenesis, together with the presence of other signs of damage such as teratocytes (multinucleated and atypical spermatids), necrotic tubular cells, dilatation of the epididymal tubules and the presence in these tubules of macrophages and desquamated spermatogenetic cells. All animals except one (75 days) in which the testes were examined were from 100 to 200 days of age at the time of death and should, therefore, have shown numerous

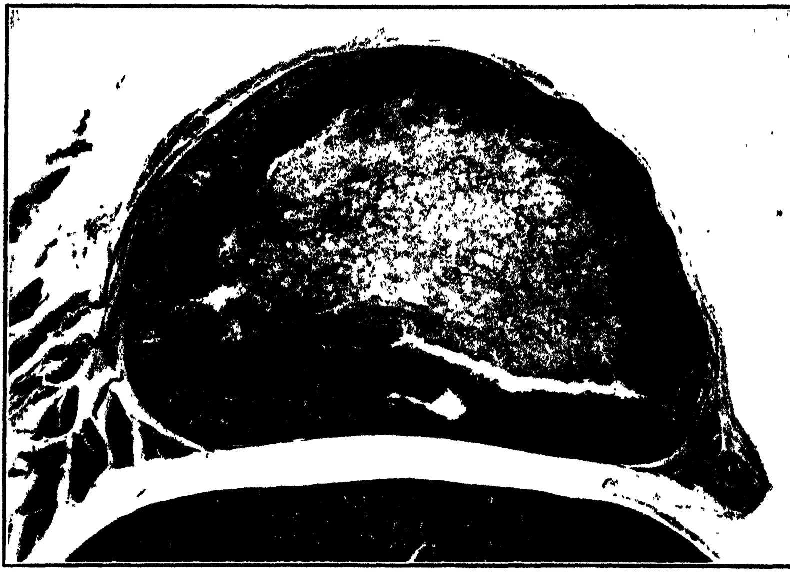

FIGURE 1. Adrenal showing nearly complete hemorrhagic cortical necrosis, with marked peripheral calcification of the necrotic area. The atypical appearance of the remaining or regenerated cortical cells can be made out. This section is cut slightly off center and the medulla is not seen. × 14.

FIGURE 2. Nearly complete hemorrhagic cortical necrosis. From within outward can be seen the intact medulla, a darker zone of hemorrhage, a lighter zone of necrotic debris, and a darker hemorrhagic peripheral zone containing a few viable cortical cells. The medulla gave a normal chromaffin reaction. × 12.

FIGURE 3.—Zones as for figure 2 The necrosis is not quite as complete. × 12.

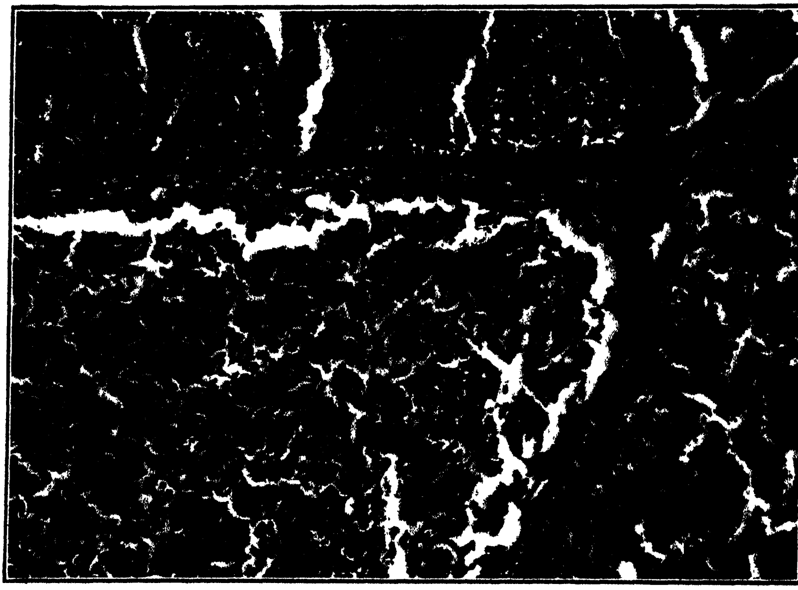

FIGURE 4.—Collagenous zone between medulla (lower left) and cortex. × 98.

spermatozoa in the testes. The numbers of spermatozoa found are shown in table 3.

TABLE 3.—*Numbers of spermatozoa in testes*

Adrenal lesion	Spermatozoa				Degenerated tubular cells	Teratocytes	Dilated tubules and desquamated cells in epididymis [1]
	None	Few	Moderate number	Many			
Severe cortical necrosis	8	0	1	0	2	5	4
Less marked cortical necrosis	4	0	2	0	4	1	4
Collagenous zone at corticomedullary junction	3	0	0	1	0	2	1
No necrosis	5	1	0	4	2	[2] 5	3
Total	20	1	3	5	8	13	12

[1] Not all of the epididymides were sectioned.
[2] Only 1 of these occurred among the 4 testes with numerous spermatozoa.

Skin.—Sections of skin from one of the paws were examined in 7 animals which at the time of death showed B_6 dermatitis; only one of these was from an animal showing severe adrenal cortical necrosis. In all 7 cases there was more or less necrosis and ulceration of the epidermis, with massive polymorphonuclear infiltration in the corium underneath. Skin from around the nose and mouth was examined in 5 animals; one showed focal ulceration with polymorphonuclear leucocytes underneath. In 14 animals skin from over the tibia was examined; 3 showed minor focal inflammatory changes and one moderate focal ulceration with numerous polymorphonuclears underneath.

Liver.—The liver was examined microscopically in all 74 animals; in 51 of these, Sudan and Nile blue fat stains were done and sections were examined by polarized light. In general, the changes were rather minor. Of the 74 livers, 51 were fat free or practically so, 12 showed slight to moderate amounts of fat in the hepatic cells, 8 showed a relatively large amount of fat in the Kupffer cells (in 2 of these the fat consisted chiefly of doubly refractile material), and 3 showed slight or moderate amounts of fat in the hepatic cells and much (relatively) in the Kupffer cells. Except for the 2 livers mentioned, doubly refractile material was absent or practically so. In the 9 livers showing much isotropic fat in the Kupffer cells, the fat globules were large, and not as sudanophilic as the fat in the hepatic cells, and also stained light tints of green or yellow with the hematoxylin-Romanowsky stain. A test for iron done on one of these animals showed that the Kupffer cells contained a moderate number of hemosiderin granules in addition to the fat, and more extensive iron tests on previous series of animals have shown that hemosiderin is usually present together with the large fat globules. The significance of this type of pigmentation is not known.

Slight atrophy was seen in 13 livers, and 2 showed minor focal necroses.

Kidney.—The kidney was examined microscopically in all except 1 of the 74 rats; Sudan and Nile blue stains for fat and examination of frozen sections by polarized light were done in 43. As in the liver, the lesions were minor. Of the 73 kidneys, 47 were fat free or practically so, 22 were fat free except for the presence of varying numbers of black crosses of polarization, sometimes together with a little spicular anisotropic material, in or toward the lumens of the convoluted tubules, and 5 showed small amounts of sudanophilic material in the convoluted tubules (none of these 5 showed spicular anisotropic material; 1 showed black crosses of polarization). Two kidneys were moderately hydronephrotic; 5 contained small numbers of hyaline to calcified tubular casts; 2 showed slight hyaline granulation of the convoluted tubule epithelium; 1 fat-free kidney showed moderate vacuolation of the convoluted tubule epithelium; 1 kidney contained a few small old foci of atrophy; and 1 showed a focal suppurative pyelonephritis. Most of the kidney lesions probably had little connection with the experimental procedure, and about the same number would probably be seen in 74 untreated rats of the same age.

Spleen.—The spleen was examined microscopically in 72 of the 74 rats. There were no outstanding findings; the spleens showed the usual marked variations in follicular size, prominence of follicle reticulum cells, perifollicular and peritrabecular hyperplasia, and myelopoiesis that any large group of rat spleens will show. A majority of the animals, however, showed excess amounts of hemosiderin. Hemosiderin was considered present within normal limits in 22, in slight excess in 42, in marked excess in 7, and present in unusually large amount in 1. Perls' reaction for ferric iron was done on 10 of these spleens.

Bone marrow and bones.—These structures were of special interest inasmuch as György et al. (*2*) have reported adrenal lesions similar to ours, together with a panmyelophthisis, on a nutritional basis. Sections were made of all or most of the tibia together with the lower part of the femur in 61 of the 74 rats. In only 1 animal (this animal showed no adrenal lesion) was there a markedly hypoplastic marrow, similar to those illustrated by György. Two marrows showed slight hyperplasia and 5 slight hypoplasia. Fourteen marrows, 12 of normal cellularity and 2 slightly hypoplastic, showed slight relative increases of certain cell lines; the granulocytic line was increased in 5, the megakaryocytes in 5, normoblasts in 2, and stem cells in 2. Some of these marrows might well be within the normal range of variation.

The bone itself was within normal limits in all 61 rats. One rat showed a small subperiosteal hemorrhage. The voluntary muscles

around the bones were normal except for 2 animals with a few small foci of coagulation necrosis (*3*).

Gastrointestinal tract.—In 5 animals, blood was noted grossly in the gastrointestinal tract. The stomach was examined microscopically in 38 animals, the duodenum in 23, the small intestine in 47, the colon in 17, and the pancreas in 57. Five rats showed slight to moderate focal lymphocyte and polymorphonuclear infiltration of the lamina propria of the stomach, especially in the pyloric region; 1 of these had gross blood in the gastrointestinal tract. The duodenum was negative in all examined. The small intestine in one animal showed slight perivascular macrophage accumulation in the submucosa; one colon showed a 1-mm. abscess in the submucosa; the other small and large intestines were negative. All sections of pancreas were negative.

Heart.—Only 3 of the 54 hearts examined showed lesions; there was one each of the following myocardial lesions in minor degree—fatty change, focal polymorphonuclear infiltration, and focal coagulation necrosis.

Eye.—Sixteen eyes were examined; the cornea, conjunctiva, iris, ciliary body, lens, retina, choroid, and sclera in all were free from lesions.

Lower jaw region.—A cross section including the tongue, the molar and incisor teeth and their supporting structures, and the jawbone, was made in 9 animals and showed no lesions except in 1 animal with a recent infarcted area on the dorsum of the tongue.

Brain.—This was sectioned in 3 animals, in each case at several levels. There were no lesions.

COMMENT

Hemorrhagic cortical necrosis of the rat adrenal is an uncommon lesion. Löwenthal (*4*), who states that the pathology of the adrenal in the common laboratory animals has scarcely been investigated, mentions that adrenal hemorrhages and fibroses occur in mice subjected to various infections. Adrenal necroses have been reported from this Institute in vaccinia and vibrion septique toxicosis in rabbits and other small animals (*5*, *6*). Also, Dr. R. D. Lillie of this Institute, in studying a series (unpublished) of guinea pigs with carbon tetrachloride poisoning, frequently found minor to marked degrees of adrenal cortical necrosis, involving chiefly the inner zone; calcification was not noted.

György et al. (*2*) in an excellently illustrated article describe a panmyelophthisis, cutaneous and splenic hemorrhages, and necrosis of the adrenals in rats on a deficient diet. The diet caused the appearance of acrodynia in from 6 to 20 weeks. Then, treatment with purified B_6 preparations was followed by anemia and a hemor-

rhagic diathesis, while treatment with more complex B_6 preparations or with milk, liver, and yeast eventually cured the acrodynia without the complication of abnormal hematopoiesis. The panmyelophthisis was not found by us except in 1 animal, as mentioned in the description of the bone marrow, and this animal had normal adrenals. The cutaneous hemorrhages and perifollicular splenic hemorrhages described and illustrated by György et al. were not seen by us, although a few of our animals showed melena, and about one-fourth slight nosebleeds. These authors examined microscopically the testes of 2 of their rats (ages not stated) and found some hemorrhage and no spermatozoa.

CONCLUSIONS

The hemorrhagic cortical necrosis of the adrenals and other lesions found in rats on diets deficient in some fraction of the vitamin B complex are described.

The panmyelophthisis which György et al. found to occur together with hemorrhagic necrosis of the adrenals in a large proportion of their rats was found in only 1 rat in this series, and this animal had no adrenal lesions.

REFERENCES

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(*3*) Pappenheimer, A. M.: The pathology of nutritional muscular dystrophy in young rats. Am. J. Path., **15**: 179–183 (1939).

(*4*) Löwenthal, Karl, *in* Jaffé, Rudolf: Anatomie und Pathologie der Spontanerkrankungen der kleinen Laboratoriumstiere. Berlin, Julius Springer (1931).

(*5*) Lillie, Ralph D., and Armstrong, Charles: The pathology of generalized vaccinia in rabbits. National Institute of Health Bulletin No. 156, United States Government Printing Office (1930).

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DEATHS DURING WEEK ENDED DECEMBER 2, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 2, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	8,541	8,934
Average for 3 prior years	[1] 8,751	
Total deaths, first 48 weeks of year	395,035	389,091
Deaths under 1 year of age	521	547
Average for 3 prior years	[1] 539	
Deaths under 1 year of age, first 48 weeks of year	23,835	25,117
Data from industrial insurance companies:		
Policies in force	66,535,899	68,314,781
Number of death claims	12,371	12,385
Death claims per 1,000 policies in force, annual rate	9.7	9.5
Death claims per 1,000 policies, first 48 weeks of year, annual rate	9.9	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (...) represent no report with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934-38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934-38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934-38, median
NEW ENG.												
Maine	6	1	21	4	60	10	1	1	241	40	5	33
New Hampshire	0	0	1	0	...	...	...	...	41	4	1	2
Vermont	0	0	0	2	...	...	...	...	308	23	2	2
Massachusetts	4	3	6	6	...	...	...	...	381	324	192	117
Rhode Island	8	1	0	0	...	...	...	...	611	80	2	3
Connecticut	0	0	2	4	15	5	5	5	137	46	75	75
MID. ATL.												
New York	5	12	35	36	[1] 8	[1] 12	[1] 14	[1] 13	204	509	707	496
New Jersey	18	15	19	19	11	9	8	14	19	16	11	33
Pennsylvania	15	29	52	70	...	...	...	...	19	37	76	109
E. NO. CEN.												
Ohio	34	44	68	68	11	14	...	11	10	13	20	72
Indiana	36	24	20	33	18	12	9	36	12	8	14	24
Illinois	30	46	41	41	5	8	8	22	16	24	28	32
Michigan [2]	6	6	21	25	6	6	1	2	286	271	173	161
Wisconsin	2	1	3	5	...	...	20	27	91	52	149	70
W. NO. CEN.												
Minnesota	2	1	18	7	4	2	6	1	83	43	296	57
Iowa	22	11	8	8	30	15	4	3	32	16	81	6
Missouri	18	14	17	37	3	2	21	58	5	4	6	8
North Dakota	15	2	4	2	7	1	14	8	124	17	53	5
South Dakota	30	4	7	1	8	1	2	...	0	0	84	4
Nebraska	8	2	1	5	...	...	...	...	4	1	4	4
Kansas	11	4	15	15	28	10	11	9	268	96	7	14
SO. ATL.												
Delaware	0	0	2	1	...	...	...	...	39	2	...	3
Maryland [2,3]	22	7	18	19	37	12	13	13	19	6	72	72
Dist. of Col.	16	2	9	11	...	...	4	3	8	1	1	5
Virginia [3]	103	55	63	57	247	132	176	...	45	24	33	33
West Virginia	48	18	31	31	43	16	18	24	5	2	15	15
North Carolina [3]	149	102	72	73	37	25	5	7	203	139	288	288
South Carolina [3]	68	25	11	11	3,679	1,347	425	377	16	6	4	4
Georgia [3]	60	36	12	23	355	214	99	...	13	8	33	0
Florida [3]	36	12	11	19	18	6	5	2	0	0	13	5

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	38	22	20	35	10	6	54	34	5	3	7	7
Tennessee [3]	39	22	19	38	39	22	53	59	49	28	12	12
Alabama [3]	67	38	27	29	820	466	124	124	25	14	48	17
Mississippi [2]	61	24	12	12	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	64	26	18	15	246	99	116	54	5	2	18	2
Louisiana [3]	19	8	13	30	17	7	12	12	0	0	26	8
Oklahoma	34	17	26	24	227	113	125	60	8	4	28	3
Texas [3]	37	45	67	79	367	443	332	332	36	43	14	18
MOUNTAIN												
Montana	9	1	2	2	6,403	684	6	6	178	19	237	11
Idaho	0	0	0	1	------	------	8	1	245	24	56	13
Wyoming	44	2	8	1	1,134	52	------	------	131	6	1	1
Colorado	53	11	16	9	559	116	24	------	82	17	9	9
New Mexico	62	5	4	4		------	1	1	12	1	5	13
Arizona	98	8	8	6	1,055	86	172	65	37	3	0	2
Utah [2]	20	2	1	0	2,940	296	28	------	516	52	23	20
PACIFIC												
Washington	0	0	6	3	------	------	------	------	1,166	378	248	75
Oregon	5	1	1	1	283	57	23	23	169	34	14	14
California [3]	25	31	60	43	16	19	37	46	110	134	872	124
Total	29	740	896	993	204	4,325	1,984	1,701	104	2,574	4,063	4,063
49 weeks	18	22,564	28,034	28,034	163	169,703	60,673	114,129	302	366,393	785,071	704,673

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	6	1	0	0	48	8	11	13
New Hampshire	0	0	0	0	0	0	0	0	10	1	10	10
Vermont	0	0	0	0	0	0	0	0	80	6	4	14
Massachusetts	0	0	2	2	2 4	2	0	0	99	84	87	153
Rhode Island	8	1	0	0	0	0	0	0	84	11	4	20
Connecticut	3	1	0	0	8	1	0	0	128	43	44	44
MID. ATL.												
New York	0.8	2	2	7	2 4	6	2	2	121	302	103	405
New Jersey	1 2	1	0	1	2 4	2	1	1	264	222	79	103
Pennsylvania	1	2	3	5	1 5	3	0	2	158	312	260	438
E. NO. CEN.												
Ohio	0	0	1	3	0.8	1	1	2	305	397	338	379
Indiana	4	3	0	1	1 5	1	0	0	205	138	143	181
Illinois	1 3	2	1	3	0 7	1	1	1	207	316	324	512
Michigan [2]	0	0	4	2	3	3	0	1	301	285	492	406
Wisconsin	0	0	1	1	5	3	0	1	178	101	155	200
W. NO. CEN.												
Minnesota	0	0	0	1	6	3	0	0	229	118	105	140
Iowa	0	0	0	1	18	9	0	1	126	62	58	92
Missouri	0	0	1	1	0	0	1	1	113	88	122	132
North Dakota	0	0	1	0	0	0	1	0	190	26	26	41
South Dakota	0	0	0	0	0	0	0	0	135	18	33	33
Nebraska	0	0	0	0	0	0	0	0	76	20	26	40
Kansas	2.8	1	0	1	6	2	0	0	358	128	153	153

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median
SO. ATL.												
Delaware	0	0	0	0	20	1	0	0	433	22	12	10
Maryland [2] [3]	6	2	0	2	6	2	0	0	154	50	51	87
Dist. of Col.	0	0	0	0	0	0	0	0	16	2	7	12
Virginia [3]	0	0	1	5	1.9	1	1	1	129	69	46	55
West Virginia	2.7	1	2	3	0	0	0	0	245	91	49	92
North Carolina [3]	2.9	2	0	2	0	0	1	2	165	113	88	87
South Carolina [3]	2.7	1	0	0	11	4	0	0	68	25	11	6
Georgia [3]	0	0	0	0	1.7	1	2	1	63	38	19	24
Florida [3]	3	1	0	0	0	0	0	0	27	9	21	10
E. SO. CEN.												
Kentucky	0	0	3	3	17	10	0	1	118	68	89	68
Tennessee [3]	4	2	2	1	0	0	1	2	132	75	32	45
Alabama [3]	1.8	1	2	2	0	0	3	1	88	50	33	30
Mississippi [3]	2.5	1	0	0	5	2	0	0	46	18	13	19
W. SO. CEN.												
Arkansas	0	0	0	0	5	2	0	0	40	16	19	14
Louisiana [3]	0	0	1	0	2.4	1	0	2	44	18	23	17
Oklahoma	2	1	0	0	2	1	1	1	36	18	56	36
Texas [3]	0.8	1	3	6	3	4	0	4	46	56	113	100
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	393	42	16	30
Idaho	0	0	2	0	10	1	0	0	102	10	24	33
Wyoming	0	0	0	0	0	0	0	0	349	16	3	16
Colorado	5	1	1	1	14	3	0	0	217	45	49	49
New Mexico	0	0	0	0	0	0	1	1	247	20	21	21
Arizona	0	0	0	1	0	0	0	0	98	8	4	12
Utah [3]	0	0	0	0	50	5	0	0	179	18	28	38
PACIFIC												
Washington	3	1	0	1	0	0	1	1	89	29	72	67
Oregon	10	2	0	0	5	1	2	0	154	31	51	54
California [3]	0	0	1	3	17	21	4	6	157	191	214	228
Total	1.2	30	34	73	4	98	24	56	153	3,834	3,741	5,022
49 weeks	1.5	1,851	2,700	5,146	6	7,134	1,657	7,147	123	151,214	175,202	209,505

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934–38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases
NEW ENG.											
Maine	0	0	0	0	0	0	2	2	320	53	79
New Hampshire	0	0	0	0	20	2	0	0	71	7	2
Vermont	0	0	0	0	0	0	0	0	764	57	61
Massachusetts	0	0	0	0	2	2	0	1	160	136	177
Rhode Island	0	0	0	0	0	0	1	0	122	16	44
Connecticut	0	0	0	0	6	2	0	1	291	98	106
MID. ATL.											
New York	0	0	0	0	2	6	6	7	198	494	694
New Jersey	0	0	0	0	8	7	1	1	167	140	384
Pennsylvania	0	0	0	0	4	7	5	19	154	303	419

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Dec. 9, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10 1938, cases	1934-38 median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases	1934-38, median	Dec. 9, 1939, rate	Dec. 9, 1939, cases	Dec. 10, 1938, cases
E. NO CEN.											
Ohio	1	1	2	0	7	9	0	4	101	132	140
Indiana	4	3	41	3	1	1	1	2	94	63	20
Illinois	3	5	0	2	6	9	7	10	73	112	595
Michigan [2]	1	1	5	0	1	1	8	5	138	131	[illegible]32
Wisconsin	11	6	11	7	0	0	3	3	193	110	486
W. NO CEN.											
Minnesota	62	32	16	14	2	1	0	0	101	52	38
Iowa	20	10	13	10	0	0	7	3	111	55	12
Missouri	6	5	11	3	3	2	5	10	18	14	27
North Dakota	0	0	0	1	0	0	1	0	95	13	8
South Dakota	15	2	11	11	0	0	0	0	8	1	2
Nebraska	0	0	3	3	0	0	1	1	46	12	11
Kansas	0	0	0	5	8	3	0	1	75	27	20
SO. ATL.											
Delaware	0	0	0	0	20	1	1	1	315	16	13
Maryland [2] [3]	0	0	0	0	19	6	5	4	170	55	48
Dist. of Col.	0	0	0	0	8	1	0	2	81	10	20
Virginia [3]	0	0	0	0	4	2	4	7	73	39	40
West Virginia	0	0	0	0	30	11	5	5	38	14	22
North Carolina [3]	1	1	0	0	7	5	1	4	130	80	227
South Carolina [3]	0	0	0	0	11	4	2	1	33	12	47
Georgia [3]	0	0	1	1	7	4	3	4	33	20	14
Florida [3]	0	1	0	0	3	1	8	2	6	2	21
E. SO. CEN.											
Kentucky	0	0	0	0	5	3	3	9	78	45	87
Tennessee [3]	0	0	0	0	12	7	1	7	78	44	12
Alabama [3]	0	0	0	0	0	0	4	2	23	13	46
Mississippi [2]	0	0	0	0	8	3	0	7	-------	-------	-------
W. SO. CEN.											
Arkansas	5	2	2	1	7	3	5	5	12	5	19
Louisiana [3]	2	1	0	0	12	5	4	8	70	29	9
Oklahoma	12	6	19	2	14	7	6	8	2	1	13
Texas [3]	5	6	5	2	9	11	26	24	48	58	33
MOUNTAIN											
Montana	9	1	4	25	0	0	0	1	56	6	37
Idaho	0	0	16	1	10	1	2	2	0	0	0
Wyoming	0	0	0	2	0	0	2	1	262	12	1
Colorado	140	29	23	22	0	0	3	0	48	10	21
New Mexico	0	0	0	0	62	5	3	7	445	36	31
Arizona	0	0	5	0	37	3	0	0	25	2	4
Utah [2]	10	1	0	0	30	3	0	0	944	95	16
PACIFIC											
Washington	0	0	3	30	15	5	1	1	52	17	26
Oregon	10	2	5	5	10	2	1	2	174	35	23
California [3]	3	4	3	3	5	6	5	9	121	148	99
Total	5	119	199	199	6	151	143	225	115	2,839	4,536
49 weeks	8	9,280	13,885	6,994	10	12,416	13,858	14,699	137	165,667	199,511

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended December 9, 1939, 76 cases as follows: Maryland, 1; Virginia, 1; North Carolina, 5; South Carolina, 4; Georgia, 29; Florida, 1; Tennessee, 14; Alabama, 7; Louisiana, 6; Texas, 7; California, 1

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
February 1939										
New Hampshire	0	3		19	0		0	24	0	0
June 1939										
New Hampshire	1			1	0		0	7	0	1
July 1939										
New Hampshire				79	0		0	2	0	1
South Carolina	86	488	2,159	27	0	243	93	15	0	125
August 1939										
New Hampshire	0			28	0		0	2	0	4
South Carolina	224	471	1,571	6	0	118	61	21	1	47
September 1939										
Massachusetts	15		3	78	2	2	20	99	0	15
Nevada	0			1	1		0	6	0	8
New Hampshire	0			12	0		4	5	0	1
South Carolina	270	742	1,912	13	0	160	36	56	1	59
October 1939										
Alaska	0			349	0		0	0	0	0
New Hampshire	0			26	0		0	9	0	0
South Carolina	375	752	1,193	4	1	122	15	65	0	37
Wisconsin	5	109		107	6		28	503	5	3
November 1939										
Connecticut	1	9		138	1		1	143	0	7
Delaware	3	4		8	1		1	82	0	7
Iowa	32	1		73	3		62	303	34	2
Missouri	55	1	2	43	2		2	258	2	25
New Hampshire	0			27	0		0	3	0	1
Texas	205	998	268	158	9	66	21	186	12	62
West Virginia	69	33		17	7		18	353	0	29
Wyoming	8	1		69	0		1	30	1	1

February 1939

	Cases
New Hampshire:	
Chickenpox	19
Mumps	3
Whooping cough	7

July 1939

	Cases
New Hampshire:	
Chickenpox	3
Mumps	7
Whooping cough	28
South Carolina:	
Chickenpox	36
Diarrhea	1,666
German measles	3
Hookworm disease	135
Mumps	101
Ophthalmia neonatorum	7
Rabies in animals	10
Septic sore throat	1
Tetanus	5
Tularaemia	1
Typhus fever	9
Undulant fever	12
Whooping cough	224

August 1939

	Cases
New Hampshire:	
Chickenpox	1
Mumps	3
Whooping cough	7
South Carolina:	
Chickenpox	13
Dengue	19
Diarrhea	603
Dysentery, amoebic	1
German measles	2
Hookworm disease	106
Mumps	36
Ophthalmia neonatorum	4
Rabies in animals	17
Tetanus	1
Tularaemia	1
Typhus fever	35
Undulant fever	10
Vincent's infection	3
Whooping cough	99

September 1939

	Cases
Chickenpox:	
Massachusetts	87
South Carolina	22

September 1939—Continued

	Cases
Dengue:	
South Carolina	5
Diarrhea:	
South Carolina	649
Dysentery:	
Massachusetts (bacillary)	56
Encephalitis, epidemic or lethargic:	
Massachusetts	1
German measles:	
Massachusetts	20
South Carolina	5
Hookworm disease:	
South Carolina	127
Mumps:	
Massachusetts	57
Nevada	8
South Carolina	36
Ophthalmia neonatorum:	
Massachusetts	112
South Carolina	7
Rabies in animals:	
Massachusetts	6
South Carolina	12
Septic sore throat:	
Massachusetts	3
South Carolina	3

Summary of monthly reports from States—Continued

September 1939—Continued

	Cases
Tetanus	
Massachusetts	2
South Carolina	3
Tularaemia.	
Massachusetts	1
South Carolina	1
Typhus fever:	
South Carolina	45
Undulant fever:	
Massachusetts	1
New Hampshire	2
South Carolina	1
Whooping cough:	
Massachusetts	401
Nevada	3
New Hampshire	6
South Carolina	93

October 1939

	Cases
Chickenpox:	
Alaska	5
New Hampshire	4
South Carolina	18
Wisconsin	1,250
Diarrhea.	
South Carolina	359
Encephalitis, epidemic or lethargic.	
Wisconsin	1
German measles:	
South Carolina	5
Wisconsin	42
Hookworm disease:	
South Carolina	97
Mumps.	
New Hampshire	1
South Carolina	20
Wisconsin	577
Ophthalmia neonatorum:	
South Carolina	8
Rabies in animals	
South Carolina	15
Scabies.	
Alaska	2
Septic sore throat.	
South Carolina	6
Wisconsin	2
Tularaemia:	
Wisconsin	1
Typhus fever:	
South Carolina	32
Undulant fever:	
South Carolina	1
Wisconsin	2
Whooping cough:	
New Hampshire	5
South Carolina	51
Wisconsin	656

November 1939

	Cases
Chickenpox:	
Connecticut	334
Delaware	47
Iowa	299
Missouri	76
New Hampshire	65
Texas	182
West Virginia	115
Wyoming	78
Dengue:	
Texas	1
Dysentery:	
Connecticut (amoebic)	1
Connecticut (bacillary)	7
Missouri	1
Texas (amoebic)	10
Texas (bacillary)	85
Encephalitis, epidemic or lethargic	
Iowa	3
West Virginia	1
German measles:	
Connecticut	10
Iowa	5
Wyoming	1
Leprosy:	
Texas	1
Mumps:	
Connecticut	137
Delaware	4
Iowa	154
Missouri	21
New Hampshire	19
Texas	27
West Virginia	1
Wyoming	74
Ophthalmia neonatorum:	
Texas	1
Rabies in animals:	
Iowa	3
Relapsing fever:	
Texas	1
Rocky Mountain spotted fever:	
Delaware	1
Septic sore throat:	
Connecticut	17
Iowa	6
Missouri	6
West Virginia	2
Wyoming	1
Trachoma	
Missouri	4
Texas	6
Trichinosis:	
Connecticut	1
Tularaemia.	
Iowa	52
Missouri	16
Texas	3
West Virginia	1
Wyoming	6
Typhus fever:	
Texas	34
Undulant fever:	
Connecticut	4
Iowa	19
Missouri	3
Texas	21
Wyoming	2
Vincent's infection:	
Wyoming	1
Whooping cough:	
Connecticut	307
Delaware	65
Iowa	48
Missouri	65
New Hampshire	10
Texas	167
West Virginia	39
Wyoming	16

WEEKLY REPORTS FROM CITIES

City reports for week ended December 2, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	231	172	44	864	598	1,258	12	343	31	1,136	-------
Current week [1]	107	136	27	547	394	880	1	325	51	798	-------
Maine:											
Portland	0	------	0	3	1	0	0	0	0	3	22
New Hampshire:											
Concord	0	------	0	0	2	1	0	0	0	0	13
Manchester	0	------	0	0	1	0	0	0	0	0	19
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Rutland	0	------	0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	8	------	0	28	13	21	0	5	1	13	187
Fall River	0	------	0	0	1	0	0	1	0	14	31
Springfield	0	------	0	1	0	3	0	2	0	2	28
Worcester	0	------	0	2	10	9	0	1	0	3	60
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	1	15
Providence	0	------	0	79	8	2	0	1	0	11	72

[1] Figures for Barre, Terre Haute, Racine, and Los Angeles estimated; reports not received.

City reports for week ended December 2, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Connecticut:											
Bridgeport	0	------	0	0	0	4	0	0	0	0	33
Hartford	1	------	0	0	2	1	0	0	0	9	36
New Haven	0	------	0	1	2	1	0	0	0	7	46
New York:											
Buffalo	0	------	0	14	8	10	0	7	0	6	142
New York	15	4	3	20	85	109	0	71	2	85	1,482
Rochester	0	1	0	0	4	3	0	0	0	3	73
Syracuse	1	------	0	0	2	4	0	0	3	25	56
New Jersey:											
Camden	2	------	0	0	2	7	0	0	0	4	24
Newark	0	------	0	0	1	8	0	7	0	29	113
Trenton	0	------	0	0	4	3	0	2	0	3	51
Pennsylvania:											
Philadelphia	2	2	1	3	18	50	0	25	3	79	541
Pittsburgh	5	------	0	3	12	25	0	7	1	18	165
Reading	1	------	0	0	0	0	0	0	0	2	18
Scranton	0	------	------	0	------	2	0	------	0	0	------
Ohio:											
Cincinnati	8	------	1	1	7	18	0	6	0	9	140
Cleveland	1	23	0	1	12	26	0	9	0	51	186
Columbus	2	2	2	2	3	6	0	1	0	0	99
Toledo	0	1	0	3	3	23	0	4	2	8	75
Indiana:											
Anderson	1	------	0	0	0	0	0	0	0	7	4
Fort Wayne	0	------	0	0	2	3	0	1	0	0	31
Indianapolis	1	------	0	2	10	32	0	4	0	15	107
Muncie	0	------	0	0	0	2	0	0	0	1	8
South Bend	0	------	0	1	2	2	0	0	0	8	16
Terre Haute	------	------	------	------	------	------	------	------	------	------	------
Illinois:											
Alton	0	------	0	0	0	2	0	0	0	0	8
Chicago	11	4	2	15	21	119	0	35	0	51	653
Elgin	1	------	0	0	1	0	0	0	0	5	9
Moline	0	------	0	0	0	0	0	0	0	0	10
Springfield	0	------	0	0	8	1	0	0	0	4	25
Michigan:											
Detroit	7	2	0	8	12	75	0	15	0	44	253
Flint	1	------	0	2	2	9	0	0	0	12	20
Grand Rapids	0	------	0	0	0	19	0	1	0	7	41
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	3	10
Madison	0	------	0	2	0	1	1	0	0	9	13
Milwaukee	0	1	1	1	2	35	0	3	0	20	80
Racine	------	------	------	------	------	------	------	------	------	------	------
Superior	0	------	0	1	0	2	0	0	0	0	5
Minnesota:											
Duluth	0	------	0	11	1	0	0	1	0	0	16
Minneapolis	0	------	0	24	4	25	0	0	0	6	99
St. Paul	0	------	0	1	4	10	0	3	0	26	59
Iowa:											
Cedar Rapids	0	------	------	3	------	0	0	------	0	1	------
Davenport	1	------	------	1	------	3	0	------	0	1	------
Des Moines	0	------	0	15	0	13	0	0	0	0	34
Sioux City	0	------	------	1	------	5	0	------	0	0	------
Waterloo	0	------	------	0	------	3	0	------	0	0	------
Missouri:											
Kansas City	2	------	0	1	7	13	0	2	0	0	113
St. Joseph	0	------	0	1	8	5	0	0	0	0	33
St. Louis	3	------	0	2	6	24	0	7	2	10	232
North Dakota:											
Fargo	0	------	0	0	0	2	0	0	0	0	8
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	5
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Nebraska:											
Lincoln	1	------	------	0	------	1	0	------	0	5	------
Omaha	4	------	0	0	3	1	0	0	0	1	45
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	12
Topeka	1	------	0	0	2	4	0	0	0	1	16
Wichita	0	------	0	26	8	5	0	0	0	0	31

City reports for week ended December 2, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Delaware:											
Wilmington	1	------	0	0	5	7	0	0	0	0	33
Maryland:											
Baltimore	2	1	0	1	12	8	0	14	0	43	239
Cumberland	0	------	0	0	0	3	0	0	2	0	9
Frederick	0	------	0	0	1	3	0	0	0	0	5
Dist of Col.:											
Washington	1	1	0	2	6	16	0	9	1	19	171
Virginia:											
Lynchburg	0	------	0	2	0	2	0	1	0	16	11
Richmond	1	------	2	2	3	2	0	3	0	0	72
Roanoke	1	------	0	0	0	1	0	0	0	0	16
West Virginia:											
Charleston	1	1	0	0	0	1	0	0	0	1	14
Huntington	1	------	------	0	------	1	0	------	0	0	------
Wheeling	0	------	0	0	1	2	0	0	1	0	23
North Carolina:											
Gastonia	1	------	------	0	------	1	0	------	0	0	------
Raleigh	0	------	0	0	1	0	0	0	0	0	17
Wilmington	3	------	0	0	0	0	0	0	0	0	9
Winston-Salem	1	------	0	0	1	2	0	2	0	0	19
South Carolina:											
Charleston	1	31	0	0	3	3	0	4	0	0	26
Florence	0	------	0	0	2	0	0	0	0	0	15
Greenville	0	------	0	0	1	1	0	1	0	0	16
Georgia:											
Atlanta	1	12	1	1	5	7	0	5	0	0	99
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	0	26	2	0	2	0	0	0	0	1	34
Florida:											
Miami	0	4	1	0	3	0	0	1	0	1	38
Tampa	1	------	0	0	1	0	0	0	0	0	32
Kentucky:											
Ashland	0	------	0	0	3	0	0	0	0	2	5
Covington	0	------	0	1	1	1	0	2	0	0	11
Lexington	0	------	0	0	0	2	0	0	0	0	18
Louisville	0	2	0	1	3	13	0	0	0	46	41
Tennessee:											
Knoxville	0	------	0	0	3	10	0	2	0	0	24
Memphis	0	------	0	0	5	6	0	4	1	8	69
Nashville	2	------	2	0	6	2	0	0	0	5	51
Alabama:											
Birmingham	2	9	1	0	2	3	0	6	0	1	65
Mobile	1	------	1	0	4	8	0	3	0	0	31
Montgomery	0	------	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	0	0	------	0	0	------	0	0	------
Little Rock	0	------	0	0	0	1	0	1	0	0	------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	3
New Orleans	3	2	2	0	10	14	0	11	19	23	160
Shreveport	0	------	0	0	3	6	0	1	0	0	32
Oklahoma:											
Oklahoma City	0	1	0	0	5	1	0	1	0	0	33
Tulsa	0	------	------	1	------	2	0	0	0	3	------
Texas:											
Dallas	2	1	1	0	2	1	0	1	0	5	60
Fort Worth	0	------	0	0	1	1	0	1	0	0	23
Galveston	0	------	0	0	3	3	0	0	0	0	15
Houston	2	------	1	0	4	2	0	6	0	0	80
San Antonio	4	2	0	6	6	1	0	6	1	0	62
Montana:											
Billings	0	------	0	1	0	0	0	0	0	0	6
Great Falls	0	------	0	0	0	0	0	0	0	0	9
Helena	0	------	0	0	0	0	0	0	0	0	4
Missoula	0	------	0	0	2	0	0	0	0	1	11
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	3
Colorado:											
Denver	1	------	1	2	2	5	0	4	1	6	70
Pueblo	0	------	0	0	2	1	0	0	0	0	10
New Mexico:											
Albuquerque	0	------	0	0	0	1	0	2	1	0	6
Utah:											
Salt Lake City	0	------	0	32	1	14	1	2	0	32	31

City reports for week ended December 2, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Washington:											
Seattle	0		1	13	1	7	0	3	4	5	113
Spokane	0	1	0	1	1	5	0	1	0	4	30
Tacoma	0		1	219	2	0	0	0	0	1	29
Oregon:											
Portland	4		0	0	2	9	0	3	0	7	93
Salem	0			4		0	0		0	0	
California:											
Los Angeles											
Sacramento	0	1	1	1	2	4	0	3	1	0	43
San Francisco	1		0	3	3	8	0	8	0	33	162

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	0
Worcester	0	0	1
New York:			
Buffalo	0	0	1
New York	0	1	2
Pennsylvania:			
Philadelphia	1	0	2
Ohio:			
Cleveland	1	0	0
Michigan:			
Detroit	0	1	1
Iowa:			
Des Moines	0	0	1
Missouri:			
Kansas City	0	0	1
South Dakota:			
Aberdeen	0	0	1
Kentucky:			
Covington	0	0	1
Oklahoma:			
Tulsa	0	0	1
Texas:			
Dallas	0	1	0
Fort Worth	0	0	1
Houston	1	0	0
Utah:			
Salt Lake City	0	0	1
Oregon:			
Portland	0	0	2
California:			
Sacramento	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Milwaukee, 1.
Pellagra.—Cases: Baltimore, 1, Charleston, S. C., 2, Miami, 1.
Typhus fever.—Cases: Worcester, 2, Baltimore, 1; Wilmington, N. C., 1; Atlanta, 3; Savannah, 4; Nashville, 4, Mobile, 1; Lake Charles, 1; Fort Worth, 1.

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended October 21, 1939.—During the 4 weeks ended October 21, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	7		Tuberculosis		1
Malaria	16	1	Typhoid fever	13	3
Poliomyelitis	1				

DENMARK

Notifiable diseases—July–September 1939.—During the months of July, August, and September 1939, cases of certain notifiable diseases were reported in Denmark as follows:

Disease	July	Aug.	Sept.	Disease	July	Aug.	Sept.
Cerebrospinal meningitis	5	3	5	Measles	686	361	363
Chickenpox	471	385	302	Mumps	79	95	166
Diphtheria	31	66	85	Paratyphoid fever	23	14	13
Dysentery	58	57	72	Poliomyelitis	3	13	36
Epidemic encephalitis	2		1	Puerperal fever	15	15	26
Erysipelas	178	215	314	Scarlet fever	548	563	791
Gastroenteritis, infectious	2,206	5,387	4,424	Syphilis	33	51	50
German measles	135	149	118	Tetanus, neonatorum	3	3	3
Gonorrhea	725	833	822	Typhoid fever		5	1
Influenza	2,308	3,323	5,215	Undulant fever	42	45	31
Malaria		9	4	Weil's disease		2	5
				Whooping cough	3,249	3,349	2,507

FINLAND

Communicable diseases—October 1939.—During the month of October 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	283	Scarlet fever	614
Influenza	1,296	Typhoid fever	21
Paratyphoid fever	51	Undulant fever	1
Poliomyelitis	6		

ITALY

Communicable diseases—4 weeks ended September 10, 1939.—During the 4 weeks ended September 10, 1939, cases of certain communicable diseases were reported in Italy as follows:

Disease	Aug. 14-20	Aug. 21-27	Aug. 28-Sept. 3	Sept. 4-10
Anthrax	35	46	51	15
Cerebrospinal meningitis	9	18	11	18
Chickenpox	113	81	74	65
Diphtheria	388	492	423	456
Dysentery (amoebic)	13	8	20	19
Dysentery (bacillary)	33	73	41	31
Hookworm disease	19	42	58	22
Lethargic encephalitis	1			1
Measles	341	308	249	204
Mumps	83	123	52	56
Paratyphoid fever	168	179	186	157
Pellagra	6	3	18	2
Poliomyelitis	181	190	220	186
Puerperal fever	24	27	25	18
Scarlet fever	175	182	168	209
Typhoid fever	867	940	801	882
Undulant fever	79	79	62	51
Whooping cough	353	340	234	245

SWITZERLAND

Notifiable diseases—August 1939.—During the month of August 1939, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Paratyphoid fever	27
Chickenpox	107	Poliomyelitis	125
Diphtheria	72	Scarlet fever	320
Dysentery	1	Tuberculosis	199
German measles	7	Typhoid fever	13
Measles	51	Undulant fever	14
Mumps	18	Whooping cough	308

YUGOSLAVIA

Communicable diseases—4 weeks ended October 8, 1939.—During the 4 weeks ended October 8, 1939, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	73	6	Poliomyelitis	15	1
Cerebrospinal meningitis	18	5	Scarlet fever	379	2
Diphtheria and croup	921	48	Sepsis	9	2
Dysentery	195	26	Tetanus	49	16
Erysipelas	229	9	Typhoid fever	700	44
Favus	7		Typhus fever	9	1
Lethargic encephalitis	1	1	Weil's disease	1	
Paratyphoid fever	42	1			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases for a six-month period appeared in the PUBLIC HEALTH REPORTS of November 24, 1939, pages 2106-2119. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

India (Portuguese).—Cholera has been reported in Portuguese India as follows: Week ended September 23, 1939, three cases, two deaths; week ended September 30, nine cases, six deaths; week ended October 7, three cases, five deaths.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau area.—A rat found on November 18, 1939, in Paauhau area, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Venezuela—Aragua State.—A report dated December 7, 1939, states that three cases of bubonic plague have been reported on La Florida farm in the Sierra Azul region, south of Tejerias, Aragua State, Venezuela. All precautionary measures have been taken.

Smallpox

Mexico.—During the month of September 1939, smallpox was reported in Mexico as follows: Mexico, D. F., four cases; Monterrey, Nuevo Leon State, one case, two deaths; San Luis Potosi, San Luis Potosi State, six cases, one death.

Typhus Fever

Mexico.—During the month of September 1939, typhus fever was reported in Mexico as follows: Mexico, D. F., twenty-five cases, three deaths; Monterrey, Nuevo Leon State, three cases; San Luis Potosi, San Luis Potosi State, one case.

Yellow Fever

Ivory Coast—Abengourou (vicinity of).—On December 1, 1939, one suspected case of yellow fever was reported on Broumia Plantation near Abengourou, Ivory Coast.

Senegal—Louga.—On December 5, 1939, one suspected case of yellow fever was reported in Louga, Senegal.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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HEALTH OF THE NATION

At the present time it can be stated with a reasonable degree of certainty that better records will be achieved in several diseases in 1939 than for the year 1938.

Diphtheria incidence has maintained a consistent recession during 1939. Only 22,564 cases have been reported for the first 49 weeks of the year as compared with 28,034 cases for the first 49 weeks of 1938. Similarly encouraging records were made by meningococcus meningitis, with 1,851 cases for the first 49 weeks of 1939 as compared with 2,700 for the corresponding period in 1938; scarlet fever with 151,214 against 175,202 for 1938; smallpox with 9,279 as compared with 13,885 in 1938; typhoid fever, 12,416 as against 13,858; and whooping cough with 165,667 in comparison with 199,511 for the same period of the preceding year.

While the measles incidence of 366,393 cases reported for the first 49 weeks of 1939 suggests an impressive reduction when compared with the total of 785,071 in 1938, it must be remembered that the 1938 total exceeded that for any year since annual records have been published. The present record of measles already exceeds the total for each of the years 1936 and 1937. While there appears to be no let-up in the prevalence of measles, the death rate at present is about one-tenth of that of 1900. Mortality from measles is virtually confined to infancy and childhood and the only practical protection against measles is to delay exposure during the critical years of age, 1 to 5.

Due to the fact that poliomyelitis reached limited epidemic proportions in certain localities, its incidence to date exceeds that of the corresponding period of 1938. The reports total 7,134 cases for the first 49 weeks of 1939 against 1,657 for a like period of 1938; however, last year's total was the lowest on record. The total cases for the first 49 weeks of 1939 exceed the usual expectancy based on the total of the corresponding median weeks of the 1934–38 period by only 1,303 cases, far below the number which would suggest general epidemic proportions.

The trend of influenza will bear watching. For nine consecutive weeks the incidence has shown an appreciable increase each week.

A total of 4,325 cases was reported for the week ended December 9 as compared with 2,756 for the preceding week and with 1,701 for the median week. The accumulated total for the first 49 weeks of 1939 is 169,793 cases, as compared with 60,673 for the corresponding period in 1938.

The influenza prevalence of the country is usually sensitively reflected in the general death rate and the present period is no exception. The Census reports from 88 large cities for the week ended December 9 indicate a death rate of 11.6 per 1,000 population, the same as for the preceding week and the highest rate from the same source since the week ended May 13, 1939. The average death rate for the 4-week period ended December 9, 1939, was 11.3 per 1,000 population as compared with 11.5 for the corresponding period of 1938. With a continued increase in influenza and the resulting increase in pneumonia, one may expect a correspondingly higher general death rate for the remaining weeks of this year.

It would at this point seem appropriate to emphasize the harmfulness of the unfortunate publicity given certain diseases such as poliomyelitis. The nature of the disease is such as to cause widespread fear, much of which is groundless, little of which is productive of well-considered action. During the past summer when localized outbreaks of poliomyelitis occurred in a limited number of areas, the appearance of a single case of the disease in a community frequently gave rise to disproportionate public concern throughout an entire State. Vacation and business trips were deferred; the propriety of opening schools on scheduled time entered into the discussion; thousands of inquiries reached the Public Health Service regarding the probability of the epidemic spread of the disease.

At the same time the public remained comparatively indifferent to the more definite menace of less well dramatized conditions, such as tuberculosis among young people. This in spite of the fact that there are as many deaths from tuberculosis each year as there were cases of poliomyelitis in the past 10 years. Approximately 8,000 persons under 20 years of age each year die of tuberculosis. Roughly 80 persons die of tuberculosis for every one who dies of poliomyelitis. It is well to face such facts and to substitute calm consideration of actual values for emotional responses to threats which though real have been built up out of all proportion to their factual importance.

TRENDS, GEOGRAPHICAL AND RACIAL DISTRIBUTION OF MORTALITY FROM HEART DISEASE AMONG PERSONS 5-24 YEARS OF AGE IN THE UNITED STATES DURING RECENT YEARS (1922-1936)

A PRELIMINARY REPORT [1]

By O. F. Hedley, *Passed Assistant Surgeon, United States Public Health Service*

Rheumatic infection is the predominant etiological factor in heart disease among persons 5-24 years of age. According to a number of observers, at least 80 percent of heart disease during this age period is definitely of rheumatic origin, approximately 10 percent is due to congenital malformations, while the remainder consists of a number of miscellaneous forms often resulting from atypical rheumatic infection. Since deaths attributed to congenital cardiac lesions are not tabulated under heart disease but with congenital malformations, subtitle 157-C of the International List of Causes of Death, it is evident that most deaths attributed to heart disease in this age period are due to rheumatic heart disease. It is believed therefore that an analysis of heart disease mortality among persons 5-24 years of age over a number of years will serve as an index of rheumatic heart disease mortality in the United States.

Deaths among persons under 5 years of age are not included in this analysis because deaths from rheumatic heart disease do not occur very frequently during this age period and because there are greater opportunities for misdiagnosis among younger children. It is likely that a large number of deaths attributed to heart disease among children under 5 years of age are due to terminal cardiac insufficiency as a result of acute infectious diseases. Some of the deaths reported as due to acquired forms of heart disease are due to congenital malformations with terminal pneumonia, a frequent complication of congenital heart disease which may render differential diagnosis of seriously ill patients extremely difficult, if not impossible.

Types other than rheumatic and congenital heart disease are not commonly encountered during the 5-24-year age period, and play an even less important role as causes of death. Scarlet fever occasionally results in a mild degree of endocarditis. When severe heart disease occurs it is usually indistinguishable in clinical course and morbid anatomy from heart disease following rheumatic fever. It is extremely doubtful if there is any such entity as "scarlet fever heart disease" (*1*). Heart disease following diphtheria usually occurs within a few weeks and deaths from this cause are directly attributable to diphtheria. Late cardiac manifestations are rare. Other acute infectious diseases of childhood practically never cause heart disease.

[1] From the Office of Heart Disease Investigations, Division of Infectious Diseases, National Institute of Health, branch office, 133 South 36th St., Philadelphia, Pa.

Heart disease due to congenital syphilis is a rarity, as is also heart disease due to acquired syphilis in persons under 25 years of age (*2*, *3*). Deaths from essential hypertension or acute coronary occlusion occasionally occur but do not constitute important problems. Most cases of acute or subacute bacterial endocarditis among persons 5–24 years of age develop as complications of rheumatic heart disease, less often as complications of congenital cardiac malformations, while occasionally bacterial endocarditis occurs as a primary condition. The chief sources of error, in this age period, consist in mistaking deaths from terminal cardiac insufficiency (from a number of causes), tuberculous pericarditis (rarely a primary disease), and glomerulonephritis for deaths caused by heart disease. On the other hand, heart disease may be overlooked, especially if seen only during the final illness. Mistaken diagnoses of pneumonia for heart disease and vice versa are not uncommon.

Certain difficulties are inherent in analyses of mortality figures, especially over a number of years. There is no doubt that standards of diagnosis of heart disease have improved considerably during the period 1922–1936. The lack of strict comparability of reports applies also to almost any other disease. Furthermore, standards of diagnosis differ in various localities and sections of the country. Statistics obtained from large urban medical centers are on the whole better than those from rural areas.

METHODS OF ANALYSIS

This report is based on information abstracted from the official mortality statistics issued annually by the United States Bureau of the Census. During the period 1922–29 deaths from heart disease in the United States registration States were tabulated under titles 87–90 of the International List of Causes of Death of 1920, while during the period 1930–36 deaths from heart disease were tabulated under titles 90–95 of the International List of 1929. No attempt was made to break down the age period 5–24 years into further subdivisions.[2]

It is believed that the rates used in this study are reasonably accurate, in spite of certain defects. Inaccuracies arise from the fact that it is not possible to take into consideration internal migrations, and

[2] Annual death rates per 100,000 population among persons 5–24 years of age during 1922–29 are based on estimated populations obtained by simple linear interpolation of the number of persons in the 5–24-year age period, according to the United States Census of 1930 as compared with the Census figures for 1920. During 1931–36 the rates were based on population estimates obtained in a somewhat different manner. During this period the United States Bureau of the Census issued semi-annual estimates of the total populations of each State, based on changes in the population as a result of births, deaths, immigration, and emigration. The estimated populations 5–24 years of age upon which the death rates are based were determined by comparing the percentages of the total population for 1920 and 1930 in the 5–24-year age group, and extrapolating on an arithmetic or straight-line basis the annual percentage increase or decrease in these percentages from 1930 to the year for which an estimated population was desired.

that changes in the composition of the population during the intercensal years since 1930 may be greater than indicated by estimates based on extrapolated percentages. This is due to the rather sharp decline in the birth rate in many States since about 1925. Although the population of the United States is still increasing, the increase is becoming less each year. There may be fewer persons in the 5–24-year age period than these estimates indicate, and this in turn would result in slightly higher death rates than those shown, with consequently less apparent reduction in the disease. In consideration of the possibility of certain inaccuracies, these figures are offered as tentative estimates with the view of adjusting these rates and continuing the study to the end of the current decade when the 1940 census returns are complete.

During 1922–29 it was possible to determine the death rates among colored as well as white persons in the United States registration States in the East South Central, West South Central, and South Atlantic States with the exception of Delaware and West Virginia. Since 1930 this information has not been available.

During the period 1922–29 death rates from heart disease among persons 5–24 years of age in large cities in the United States were not determined because the method of tabulating mortality by age periods for cities was not the same as for States, nor was it comparable to the method employed for cities after 1930. During the period 1922–29 the census mortality tables of deaths by age for cities included only "other organic diseases of the heart" and not the total for heart disease. Therefore, no rates were computed for cities for this period.

Since 1930 deaths from heart disease in large cities have been tabulated in a manner comparable to that used in States. Unfortunately, annual estimates of the total populations of cities since 1930 are not available. The Bureau of the Census made an estimate of the population of urban places of 10,000 or more persons as of July 1, 1933. Later estimates were not made because it became evident that by reason of the unusual movement of population since 1930 any estimates based on mathematical formulae would be far from satisfactory.

In nearly all cities of over 100,000 population the increase between April 1, 1930, and July 1, 1933, was less than 5 percent. Washington, D. C., Detroit, Mich., and Los Angeles, Calif., are notable exceptions. In the majority the increase was less than 3 percent, while in many it was less than 1 percent. Some cities had a drop in the estimated population of July 1, 1933. Since the birth rates in cities are declining, the increase in population among persons 5–24 years of age is probably even less than for the general population. Table 3 shows the mean annual death rate among persons 5–24 years of age from heart disease in principal cities of the United States during 1930–32, based on the 1930 census figures. It was prepared to show the relative

incidence of deaths during this age period in different parts of the country, and not trends in mortality. By determining the mean rates for 3 years, annual variations are minimized. Since this period is so close to the 1930 census count, the error in population estimates is probably not very large.

TRENDS IN MORTALITY

A downward trend in heart disease mortality among young persons has been noted by several writers. Dublin and Lotka (*4*), in a study of the mortality experience among industrial policyholders of the Metropolitan Life Insurance Co., noted a decline of nearly 50 percent in mortality from organic heart disease among white policyholders aged 1 to 24 years in 1931–35 as compared with 1911–15. There was also a substantial decline among colored policyholders. This decline applied to policyholders as old as 45 years of age. Cohn and Lingg (*5*, *6*) noted that among persons under 40 years of age mortality from heart disease has been falling steadily since 1900. Emerson (*7*) also comments on the decline in deaths from heart disease among young persons.

In table 1 death rates from heart disease among persons 5–24 years of age are shown, based on the estimated number of persons in that age group. Figures are incomplete in a number of States which were added to the registration area since 1922; Texas, for instance, became a member in 1933.

In every section of the country and in every State of the Union in which statistics were obtained there was a decline in the mean annual death rate in 1930–36 as compared with 1922–29. This is especially noticeable in the New England, Middle Atlantic, East North Central, and Pacific Coast States, in which sections the estimated decline was over 25 percent. Among States comprising the continental registration area in 1922, Massachusetts showed the greatest decrease during the current decade as compared with the preceding one. The estimated decrease in Massachusetts was 36.1 percent. Declines of over 30 percent were indicated in Vermont, New Jersey, Illinois, North Dakota, Maryland, Oregon, and California. Many other States showed decreases of at least 20 percent.

Comparing the rates in 1922 with those in 1936, a decrease is noted in every State except Montana, in which there was a very slight increase, Louisiana, and Florida, which showed an increase of about 30 percent. The increase in Florida may be due to nonresident deaths. In recent years there has been a tendency to send rheumatic cardiac patients south, especially to Florida, as a therapeutic measure. In each geographical section there was a decline in the last of this 15-year period as compared with the first year under study. Although the decline has been more precipitous since 1930, it began prior to that year in many States and geographical sections.

TABLE 1.—*Death rates from heart disease per 100,000 persons 5–24 years of age during 1922–36 by States and sections of the United States, based on estimated populations. Also percentage decrease in 1930–36 as compared with 1922–29*

Section and State	Specific death rates per 100,000 persons 5-24 years of age based on estimated populations															Mean annual death rate, 1922–29	Estimated mean annual death rate, 1930–36	Estimated percentage decrease, 1930–36 compared with 1922–29	Estimated mean annual death rate, 1922–36
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936				
NEW ENGLAND STATES	20.1	19.0	21.7	22.8	19.9	22.1	18.5	18.6	16.6	15.8	14.6	13.7	13.8	12.6	13.2	20.3	14.3	29.6	17.4
Maine [1]	11.8	7.7	10.9	9.4	10.4	15.8	10.7	5.7	8.0	12.8	9.2	7.4	7.3	5.9	8.8	10.5	8.5	19.0	9.3
New Hampshire [1]	12.5	11.1	13.6	16.1	18.6	12.1	13.9	12.6	10.5	15.2	12.0	10.6	11.1	10.9	11.4	14.2	11.7	17.6	12.6
Vermont [1]	16.2	4.0	9.6	15.2	15.1	11.1	12.6	10.2	16.3	12.3	6.1	7.5	8.9	4.4	2.9	11.9	8.2	31.1	10.0
Massachusetts [1]	24.6	23.8	25.4	28.3	22.4	27.1	20.8	21.9	18.0	18.6	16.2	15.7	16.0	14.8	15.3	24.3	16.4	36.1	20.5
Rhode Island [1]	23.8	17.0	23.6	19.5	17.5	20.1	17.0	22.0	17.5	16.7	17.5	14.7	10.7	12.3	12.3	20.2	14.5	28.2	17.7
Connecticut [1]	14.4	18.7	21.8	20.5	20.6	18.8	19.7	18.5	18.8	11.1	14.8	13.6	14.8	12.9	13.5	19.2	14.2	26.0	16.7
MIDDLE ATLANTIC STATES	27.4	28.1	29.8	29.5	26.7	27.5	26.1	26.2	23.4	21.8	20.6	20.3	18.0	19.0	17.6	27.6	20.1	27.2	24.3
New York [1]	30.1	30.0	32.6	31.6	28.7	29.2	28.0	27.2	24.6	22.4	22.2	22.3	19.5	19.5	18.8	29.7	21.3	28.3	26.2
New Jersey [1]	29.3	30.5	28.8	31.1	26.7	28.3	29.1	27.5	24.3	21.8	18.8	18.5	17.9	21.5	16.9	28.9	19.9	31.1	24.9
Pennsylvania [2]	23.7	25.1	27.0	26.5	24.4	25.2	22.7	24.5	21.7	21.0	19.8	18.9	16.4	17.5	16.5	24.9	18.8	24.5	22.0
EAST NORTH CENTRAL STATES	19.5	20.3	20.6	20.3	20.1	19.8	18.8	19.1	16.7	15.8	13.7	14.2	13.3	13.7	12.9	19.8	14.3	27.8	17.5
Ohio [2]	17.6	20.0	18.5	20.1	18.0	17.4	17.4	15.5	14.4	13.0	12.5	12.7	12.5	13.1	12.5	18.0	12.9	28.3	15.9
Indiana [1]	17.1	18.1	17.5	18.7	17.3	16.2	14.8	18.6	15.1	14.5	11.5	12.2	11.9	11.6	13.1	17.3	12.8	26.0	15.1
Illinois [2]	24.7	23.5	24.3	24.3	25.1	25.1	23.7	23.4	19.7	18.8	16.4	17.3	15.6	16.3	15.1	24.3	17.0	30.0	21.2
Michigan [1]	18.5	21.3	23.5	18.6	20.8	20.0	19.3	20.2	17.0	16.5	13.1	14.6	14.5	13.1	12.6	20.2	14.5	28.2	18.1
Wisconsin [2]	15.0	14.6	15.2	15.3	14.0	15.4	13.4	14.8	14.9	14.3	13.0	11.2	8.4	11.1	8.5	14.7	11.6	21.1	13.5
WEST NORTH CENTRAL STATES	14.9	13.8	15.3	14.5	13.1	14.3	12.9	12.9	12.7	12.1	11.2	9.9	10.4	11.0	10.5	[3] 13.9	11.1	20.1	[3] 12.0
Minnesota [2]	15.9	13.7	18.0	15.0	14.3	14.7	12.5	13.3	13.4	11.0	11.6	8.1	10.6	9.2	10.9	14.7	10.7	27.2	12.8
Iowa	----	13.4	11.5	12.3	11.4	13.6	10.2	10.8	11.4	10.2	10.1	8.7	8.7	9.7	11.2	[3] 11.9	10.0	16.0	[3] 10.9
Missouri [2]	14.4	15.0	17.7	17.8	14.8	16.1	16.1	15.4	12.2	14.4	11.0	10.9	10.5	11.3	9.3	15.9	11.6	27.0	13.7
North Dakota	----	----	13.0	14.6	14.9	12.0	11.6	11.2	7.1	9.0	8.3	9.6	9.2	10.7	8.1	[3] 12.8	8.9	30.5	[3] 10.7
South Dakota	----	----	----	----	----	----	----	----	13.8	11.0	10.6	9.9	9.2	11.6	9.5	----	10.8	----	[3] 10.8
Nebraska [2]	18.8	12.2	15.8	13.2	10.9	16.4	13.8	11.9	14.9	11.1	9.5	8.6	10.4	11.1	11.4	14.2	11.0	22.5	12.8
Kansas [2]	11.3	13.5	12.5	11.1	11.3	10.8	11.1	12.0	9.2	9.5	7.8	9.0	8.8	9.7	8.3	11.8	8.9	24.6	10.5

See footnotes at end of table.

TABLE 1.—*Death rates from heart disease per 100,000 persons 5–24 years of age during 1922–36 by States and sections of the United States, based on estimated populations. Also percentage decrease in 1930–36 as compared with 1922–29*—Continued

Section and State	Specific death rates per 100,000 persons 5–24 years of age based on estimated populations															Mean annual death rate, 1922–29	Estimated mean annual death rate, 1930–36	Estimated percentage decrease, 1930–36 compared with 1922–29	Estimated mean annual death rate, 1922–36
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936				
SOUTH ATLANTIC STATES	15.1	15.5	15.3	14.8	15.6	14.5	14.1	14.4	14.9	13.0	12.1	10.9	11.9	11.2	12.3	[3] 14.8	12.3	16.9	[3] 12.1
Delaware [3]	22.1	15.8	21.7	26.3	23.8	25.9	18.7	18.6	10.3	18.0	17.7	17.5	16.2	9.6	16.9	21.2	15.2	28.3	18.3
Maryland,[3] total	24.5	22.3	22.1	22.9	22.0	19.9	19.5	16.4	17.9	15.7	15.8	11.4	12.2	14.6	16.4	21.2	14.8	30.2	18.4
White	22.3	19.2	19.3	21.4	23.2	19.3	18.3	15.3								19.7			
Colored	34.7	36.3	34.6	29.8	16.2	22.6	25.2	21.3								27.5			
District of Columbia,[1] total	29.3	33.3	24.3	24.8	24.7	26.5	22.4	19.7	23.5	26.1	25.3	19.4	24.2	16.7	16.4	25.4	21.5	15.4	22.5
White	25.6	28.4	17.0	18.9	13.2	21.6	18.8	11.2								19.3			
Colored	39.0	45.6	42.5	39.6	52.8	38.4	31.2	39.5								41.0			
Virginia,[3] total	14.4	14.3	14.2	14.4	13.7	13.4	13.4	12.1	13.1	12.8	11.4	10.7	11.1	9.7	11.2	13.7	11.4	16.8	12.4
White	12.4	11.3	11.1	10.6	10.5	11.8	9.5	9.2								10.8			
Colored	18.9	21.0	21.4	23.5	21.3	17.1	22.9	19.3								20.7			
West Virginia				10.7	11.7	11.3	11.8	11.4	12.0	10.7	9.5	8.4	11.2	11.1	8.8	[3] 11.3	10.2	9.7	[3] 11.0
North Carolina,[3] total	11.7	12.6	11.4	11.7	13.2	12.2	12.0	14.3	15.6	12.3	10.9	9.5	11.0	9.8	11.7	12.4	11.5	7.3	12.1
White	8.5	10.8	7.8	8.1	8.7	9.5	8.7	9.1								8.8			
Colored	18.8	17.0	19.0	19.6	22.8	17.9	19.1	25.6								20.0			
South Carolina,[3] total	14.6	15.3	15.0	15.6	16.2	12.5	15.5	19.4	15.5	16.2	12.6	12.6	12.7	12.6	11.8	15.5	13.4	13.5	14.3
White	10.7	10.0	10.9	6.5	6.6	7.0	9.7	8.9								8.7			
Colored	18.1	20.1	18.8	24.4	25.5	18.0	21.5	30.4								22.1			
Georgia, total							13.7	12.3	14.6	10.7	11.0	10.5	11.4	11.9	13.6	[3] 13.0	12.0	8.0	[3] 12.1
White							8.4	8.1								8.3			
Colored							21.7	18.9								20.2			
Florida,[3] total	9.2	12.3	16.5	13.3	18.9	18.6	13.7	16.4	15.2	11.9	13.6	12.6	11.6	9.4	12.0	15.0	12.3	18.0	14.1
White	7.2	9.5	10.0	10.8	16.7	12.5	11.2	11.9								11.4			
Colored	13.1	17.9	29.3	18.3	23.3	31.5	18.8	26.3								22.5			
EAST SOUTH CENTRAL STATES	10.8	10.9	11.6	11.1	11.4	10.4	11.3	11.6	11.6	10.4	9.3	9.3	9.6	9.0	9.1	[3] 11.3	9.7	14.2	[3] 9.9
Kentucky,[3] total	11.8	11.9	11.7	10.5	12.5	9.9	10.2	10.3	11.0	11.0	9.8	10.4	10.8	9.6	8.1	11.1	10.1	9.0	10.5
White	10.7	11.2	11.3	9.8	11.2	9.3	8.7	9.8								10.2			
Colored	23.9	19.5	16.2	18.6	23.2	16.6	27.5	16.9								20.9			
Tennessee,[3] total	10.1	9.6	10.5	10.4	11.4	10.7	11.5	11.4	9.4	8.7	8.5	7.2	9.4	8.2	8.3	10.7	8.5	20.6	9.6
White	8.5	8.0	8.5	8.4	9.2	9.3	9.0	10.0								8.9			
Colored	17.2	16.2	19.2	19.1	21.1	17.1	22.6	17.5								18.8			

Alabama, total	-----	-----	-----	11.5	12.2	10.0	12.0	13.9	12.6	9.9	9.3	10.4	9.5	9.1	10.1	[3] 12.0	10.1	15.8	[3] 10.8
White	-----	-----	-----	6.2	8.7	6.2	7.5	10.1	-----	-----	-----	-----	-----	-----	-----	7.8	-----	-----	-----
Colored	-----	-----	-----	20.0	18.1	16.5	19.7	20.6	-----	-----	-----	-----	-----	-----	-----	19.0	-----	-----	-----
Mississippi,[2] total	10.4	11.2	12.7	12.3	9.0	11.0	11.3	10.1	13.7	12.6	10.1	9.1	8.3	9.1	10.4	11.0	10.5	4.5	10.9
White	8.1	7.2	7.4	7.5	5.3	7.6	6.5	5.5	-----	-----	-----	-----	-----	-----	-----	6.9	-----	-----	-----
Colored	12.4	14.8	17.4	16.7	12.4	14.1	15.8	14.4	-----	-----	-----	-----	-----	-----	-----	14.8	-----	-----	-----
WEST SOUTH CENTRAL STATES	10.4	11.0	13.9	12.3	12.8	11.1	10.7	10.1	9.9	9.3	7.8	8.9	8.8	8.5	9.3	[3] 10.2	8.9	12.7	[3] 9.6
Arkansas, total	-----	-----	-----	-----	-----	8.3	9.0	9.5	8.4	6.7	7.9	7.2	6.5	7.1	6.9	[3] 8.9	7.2	19.1	[3] 7.7
White	-----	-----	-----	-----	-----	6.2	8.0	8.0	-----	-----	-----	-----	-----	-----	-----	7.4	-----	-----	-----
Colored	-----	-----	-----	-----	-----	14.2	11.8	13.8	-----	-----	-----	-----	-----	-----	-----	13.3	-----	-----	-----
Louisiana,[2] total	10.4	11.0	13.9	12.3	12.8	13.7	13.3	13.0	14.2	12.0	9.1	12.6	12.9	12.3	12.1	12.6	12.2	3.2	12.4
White	6.2	7.4	7.7	5.9	6.6	7.2	7.8	7.6	-----	-----	-----	-----	-----	-----	-----	7.1	-----	-----	-----
Colored	16.9	16.5	23.6	22.6	22.7	24.1	22.1	22.0	-----	-----	-----	-----	-----	-----	-----	21.3	-----	-----	-----
Oklahoma, total	-----	-----	-----	-----	-----	-----	9.9	8.1	7.5	9.2	8.3	8.3	7.8	7.1	8.1	[3] 9.0	7.8	13.3	[3] 8.4
White	-----	-----	-----	-----	-----	-----	9.1	7.9	-----	-----	-----	-----	-----	-----	-----	8.5	-----	-----	-----
Colored	-----	-----	-----	-----	-----	-----	15.8	9.8	-----	-----	-----	-----	-----	-----	-----	12.7	-----	-----	-----
Texas, total	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.5	8.5	8.4	9.8	-----	[3] 8.8	-----	[3] 8.8
White	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Colored	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MOUNTAIN STATES	27.6	23.1	24.5	25.2	23.9	24.6	22.1	22.1	21.1	18.2	18.3	17.0	16.6	18.4	18.1	[3] 22.6	18.2	19.5	[3] 19.2
Montana [2]	17.3	16.2	21.1	22.5	14.9	20.3	21.2	20.6	22.6	12.2	11.2	11.6	17.3	13.4	17.5	19.5	15.1	22.6	17.2
Idaho [2]	25.8	17.7	14.7	16.9	19.0	18.4	21.0	22.6	20.1	16.5	17.9	16.5	10.6	19.5	20.2	19.7	17.3	12.2	18.1
Wyoming [2]	22.7	28.8	15.4	22.6	22.2	22.9	13.0	19.8	18.4	15.9	22.5	16.7	11.0	16.3	17.3	21.1	16.8	20.4	19.1
Colorado [2]	28.6	20.7	26.5	26.7	29.1	27.4	24.5	24.2	22.7	22.3	18.8	22.0	17.3	20.7	16.9	26.0	20.1	22.7	23.3
New Mexico	-----	-----	-----	-----	-----	-----	-----	16.0	17.0	14.8	19.8	12.6	13.2	14.8	17.0	[3] 16.0	15.6	2.5	15.6
Arizona	-----	-----	-----	-----	13.8	17.1	11.9	13.3	14.0	11.8	13.9	7.9	19.0	11.0	13.3	14.0	13.0	5.8	13.4
Utah [2]	39.3	36.7	36.2	33.2	35.6	35.1	31.4	31.9	28.9	27.4	25.9	24.5	25.7	28.6	25.0	[3] 34.9	26.6	23.8	[3] 31.2
Nevada	-----	-----	-----	-----	-----	-----	-----	27.7	13.6	9.9	12.9	12.7	3.1	12.2	12.0	[3] 27.7	10.9	60.6	[3] 13.8
PACIFIC STATES	17.9	17.6	20.4	15.5	15.9	16.2	14.5	14.8	13.9	13.2	13.0	10.3	9.8	9.8	11.1	16.5	11.6	29.7	14.5
Washington [2]	17.9	14.2	17.6	14.7	17.0	14.1	14.8	13.7	16.1	10.8	14.3	10.3	10.9	8.4	11.6	15.4	11.7	24.0	13.8
Oregon [2]	15.1	16.9	29.3	19.3	16.0	18.9	11.3	18.2	11.6	14.4	12.5	10.6	8.5	11.9	13.0	17.1	11.8	31.0	14.6
California [2]	18.6	19.0	32.0	15.1	15.5	16.3	15.0	14.5	13.7	13.6	12.8	10.3	9.8	9.8	10.6	16.7	11.5	31.1	14.7
Total, United States	19.7	19.6	20.8	20.2	18.9	19.0	17.6	17.8	15.6	14.5	13.4	13.3	12.8	13.0	12.9	19.2	13.9	27.6	15.3
Total, 10 original Registration States and District of Columbia	24.5	24.9	26.5	26.1	23.9	24.7	23.1	23.1	20.5	19.1	17.5	17.5	16.5	16.3	15.7	24.6	17.6	28.5	21.1
Total, 36 States and District of Columbia in registration area in 1922	19.7	19.8	21.1	20.5	19.5	19.8	18.7	18.9	17.4	16.3	14.9	14.4	13.7	13.9	13.6	19.7	14.9	24.4	17.4

[1] 10 States and District of Columbia in original U. S. registration States before 1900.
[2] 26 other States added to U. S. registration States by 1922.
[3] Data incomplete—from States admitted to U. S. registration States since 1922.

In the 10 original registration States and the District of Columbia the death rate from heart disease among persons 5–24 years of age was 15.7 per 100,000 in 1936, as compared with 24.5 per 100,000 in 1922. The mean annual death rate from this cause during the age period under study was 17.6 per 100,000 in 1930–36, as compared with 24.6 per 100,000 during 1922–29, a decrease of 28.5 percent. The highest death rate, 26.5 per 100,000, occurred in 1924. The rate has been decreasing since that year, the decrease becoming more marked during recent years.

For the 36 States and the District of Columbia which made up the registration States of 1922, the death rate was 19.7 per 100,000 in 1922, as compared with only 13.6 per 100,000 in 1936. The mean annual death rate per 100,000 was 14.9 during 1930–36, as compared with 19.7 per 100,000 during 1922–29, a decline of 24.4 percent.

During 1922–29 it was possible to determine the mortality rates from heart disease among persons 5–24 years of age according to color in a large number of States in the southern part of the country. These rates invariably indicated a higher mortality among colored persons. In most States the rates were twice as high in the colored as in the white race. With the exception of Maryland and possibly Kentucky, there was no tendency for the death rate from heart disease among colored persons of this age period to decline. In several Southern States, notably South Carolina, Florida, and Louisiana, it appeared to be increasing.

A considerable decline among white persons was indicated in Maryland, the District of Columbia, and Virginia, while in other Southern States little or no decline was observed during these 8 years.

The number of deaths upon which the rates in table 1 are based is shown in table 1A. Although the use of numbers to denote trends in mortality is liable to result in erroneous conclusions, in this instance it offers several features worth noting. Despite an increase in the estimated population of the registration States from 109,248,393 persons in 1922 to 128,024,000 in 1936, there was a decrease of from 6,631 to 6,321 in deaths from heart disease among persons 5–24 years of age. In the 36 States and the District of Columbia comprising the registration area in 1922 the number of deaths decreased from 6,631 during that year to 5,328 in 1936, a decline of 19.7 percent. The largest number of deaths, 7,339, was reported in this area in 1924. Since then there has been a decline of 27.4 percent. In the 10 original registration States and the District of Columbia the number of deaths decreased from 2,540 to 1,947, or 23.3 percent, during the 15 years under study. The largest number of deaths, 2,864, was reported in 1925. Between that year and 1936 there was a decline of 32.0 percent in the original registration area.

TABLE 1A.—*Number of deaths reported as due to heart disease, by States and sections of the United States during 1922–36, among persons 5–24 years of age*

Section and State	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	Total
NEW ENGLAND	534	510	591	629	555	626	530	539	487	468	435	412	421	389	411	7,537
Maine [1]	32	21	30	26	29	44	30	16	23	37	27	22	22	18	27	404
New Hampshire [1]	19	17	21	25	29	19	22	20	17	25	20	18	19	19	20	310
Vermont [1]	20	5	12	19	19	14	16	13	21	16	8	10	12	6	4	195
Massachusetts [1]	337	330	356	401	321	393	306	326	269	280	244	239	246	231	240	4,519
Rhode Island [1]	52	39	55	46	42	49	42	55	44	42	44	37	27	31	31	636
Connecticut [1]	74	98	117	112	115	107	114	109	113	68	92	86	95	84	89	1,473
MIDDLE ATLANTIC	2,316	2,421	2,614	2,632	2,423	2,538	45 '20	2,498	2,259	2,117	2,030	2,009	1,792	1,916	1,774	33,783
New York [1]	1,150	1,172	1,298	1,281	1,186	1,228	1,200	1,185	1,080	990	983	990	870	873	844	16,330
New Jersey [1]	362	387	375	415	366	397	419	404	364	331	288	287	281	342	271	5,289
Pennsylvania	804	862	941	936	871	913	831	909	815	796	759	732	641	695	659	12,164
EAST NORTH CENTRAL	1,583	1,681	1,731	1,734	1,742	1,745	1,687	1,738	1,524	1,446	1,260	1,306	1,223	1,268	1,206	22,874
Ohio	374	432	406	449	410	401	408	370	345	314	303	308	305	321	306	5,452
Indiana [1]	186	199	194	209	195	185	170	216	177	172	138	148	145	143	163	2,640
Illinois	604	583	612	622	650	660	633	634	539	516	450	477	430	452	419	8,281
Michigan [1]	265	316	360	293	338	334	331	357	300	289	229	253	253	233	227	4,378
Wisconsin	154	151	159	161	149	165	145	161	163	155	140	120	90	119	91	2,123
WEST NORTH CENTRAL	508	597	706	671	609	669	606	608	600	576	533	473	498	527	508	8,689
Minnesota	148	128	169	142	136	140	120	128	130	107	113	79	103	90	107	1,840
Iowa		120	103	111	103	123	92	98	104	93	92	80	80	89	103	1,391
Missouri	185	193	228	230	191	209	209	201	162	192	168	149	145	156	129	2,747
North Dakota			37	42	43	35	34	33	21	27	25	29	28	33	25	412
South Dakota									39	31	30	28	26	33	27	214
Nebraska	97	63	82	69	57	86	73	63	79	59	50	45	54	58	59	994
Kansas	78	93	87	77	79	76	78	85	65	67	55	63	62	68	58	1,091
SOUTH ATLANTIC	651	677	677	766	821	772	948	982	1,030	912	858	780	859	819	907	12,459
Delaware	18	13	18	22	20	22	16	16	9	16	16	16	15	9	16	242
Maryland, total	138	127	127	133	129	118	117	99	109	96	97	70	75	90	101	1,626
White	103	90	91	102	112	94	90	76	78	68	74	58	51	66	79	1,232
Colored	35	37	36	31	17	24	27	23	31	28	23	12	24	24	22	394

See footnotes at end of table.

TABLE 1A.—*Number of deaths reported as due to heart disease, by States and sections of the United States during 1922–36, among persons 5–24 years of age*—Continued

Section and State	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	Total
SOUTH ATLANTIC—Continued.																
District of Columbia,[1] total	43	49	36	37	37	40	34	30	37	42	42	33	43	31	31	565
White	27	30	18	20	14	23	20	12	17	25	26	15	21	14	13	295
Colored	16	19	18	17	23	17	14	18	20	17	16	18	22	17	18	270
Virginia, total	145	144	144	147	140	137	138	125	138	137	123	118	124	109	128	1,997
White	87	80	79	76	76	86	70	68	68	80	68	68	66	62	64	1,098
Colored	58	64	65	71	64	51	68	57	70	57	55	50	58	47	64	899
West Virginia				74	82	81	86	84	90	81	73	65	88	88	71	963
North Carolina, total	147	162	150	158	182	171	172	210	233	187	168	149	175	157	190	2,611
White	71	92	70	74	82	91	85	91	108	95	79	86	95	73	91	1,283
Colored	76	70	80	84	100	80	87	119	125	92	89	63	80	84	99	1,328
South Carolina, total	119	125	123	129	134	104	130	163	132	140	110	111	113	114	108	1,855
White	41	39	43	26	27	29	41	38	41	40	32	36	28	36	28	525
Colored	78	86	80	103	107	75	89	125	91	100	78	75	85	78	80	1,330
Georgia, total							180	162	194	143	148	142	155	163	187	1,474
White							67	65	72	52	60	52	66	54	84	572
Colored							113	97	122	91	88	90	89	109	103	902
Florida, total	41	57	79	66	97	99	75	93	88	70	81	76	71	58	75	1,126
White	21	29	32	36	58	45	42	46	35	40	33	42	39	34	43	575
Colored	20	28	47	30	39	54	33	47	53	30	48	34	32	24	32	551
EAST SOUTH CENTRAL	314	319	342	459	475	435	477	493	501	454	413	414	431	409	418	6,354
Kentucky, total	121	123	122	110	132	105	109	111	120	122	111	119	125	113	96	1,739
White	100	106	108	94	108	91	86	97	96	110	93	102	101	89	85	1,466
Colored	21	17	14	16	24	14	23	14	24	12	18	17	24	24	11	273
Tennessee, total	105	100	111	111	123	117	126	126	106	99	98	84	112	99	101	1,618
White	71	68	73	73	81	83	81	91	62	67	69	61	79	67	68	1,094
Colored	34	32	38	38	42	34	45	35	44	32	29	23	33	32	33	524
Alabama, total				131	141	116	141	165	152	120	114	130	120	116	129	1,575
White				45	63	45	56	76	66	64	65	56	62	54	61	713
Colored				86	78	71	85	89	86	56	49	74	58	62	68	862
Mississippi, total	88	96	109	107	79	97	101	91	123	113	90	81	74	81	92	1,422
White	32	29	30	31	22	32	28	24	45	35	28	27	33	21	34	451
Colored	56	67	79	76	57	65	73	67	78	78	62	54	41	60	58	971
WEST SOUTH CENTRAL	86	92	118	106	111	187	291	277	275	260	219	475	466	456	501	3,920
Arkansas, total						67	73	77	69	56	67	62	56	62	61	650
White						37	48	48	45	31	43	43	34	42	36	407
Colored						30	25	29	24	25	24	19	22	20	25	243
Louisiana, total	86	92	118	106	111	120	118	117	128	108	82	113	115	109	107	1,630
White	31	38	40	31	35	39	43	42	51	36	32	49	48	56	47	618
Colored	55	54	78	75	76	81	75	75	77	72	50	64	67	53	60	1,012

Oklahoma, total							100	83	78	96	70	87	83	75	86	758
White							81	71	70	81	55	75	71	63	73	640
Colored							19	12	8	15	15	12	12	12	13	118
Texas, total												213	212	210	247	882
White												142	152	170	182	64[illegible]
Colored												71	60	40	65	236
MOUNTAIN	275	233	250	260	287	299	273	323	310	268	272	253	250	279	276	4,108
Montana	34	32	42	45	30	41	43	42	46	25	23	24	36	28	37	528
Idaho	45	31	26	30	34	33	38	41	37	31	34	32	21	39	41	513
Wyoming	17	22	12	18	18	19	11	17	16	14	20	15	10	15	16	240
Colorado	101	74	96	98	108	103	93	93	88	87	74	87	69	83	68	1,322
New Mexico								29	31	27	36	23	24	27	31	228
Arizona					22	28	20	23	24	20	23	13	31	18	22	244
Utah	78	74	74	69	75	75	68	70	64	61	56	55	58	65	57	1,001
Nevada								8	4	3	4	4	1	4	4	32
PACIFIC	364	372	450	356	378	399	371	391	374	358	359	287	277	279	320	5,335
Washington	87	70	88	75	88	74	79	74	88	60	80	58	62	48	67	1,098
Oregon	43	49	60	58	49	59	36	59	38	48	42	36	29	41	45	692
California	234	253	302	223	241	266	256	258	248	250	237	193	186	190	208	3,545
Total, United States	6,631	6,902	7,479	7,613	7,401	7,670	7,633	7,849	7,360	6,859	6,379	6,409	6,217	6,336	6,321	105,059
Total, 10 original registration States and District of Columbia	2,540	2,633	2,854	2,864	2,677	2,810	2,684	2,731	2,445	2,292	2,115	2,123	2,013	2,011	1,947	36,739
Total, 36 States and District of Columbia registration area in 1922	6,631	6,782	7,339	7,255	7,010	7,220	6,907	7,087	6,554	6,162	5,697	5,533	5,313	5,418	5,328	96,236

[1] Ten States and District of Columbia in original U. S. registration States.

In table 2 are shown, by geographical sections, mortality rates from heart disease per 100,000 persons 5–24 years of age in the 36 States and the District of Columbia which were members of the registration area at the beginning of 1922. This gives a more uniform group than is shown in table 1, in which the States which subsequently became members are also included. In the New England, Middle Atlantic, East North Central, and Pacific sections, all of the States were in the continental registration area in 1922. In other sections one or more States were admitted to the registration area after that time. In the West South Central section, Louisiana was the only State in the registration area in 1922. With the exception of this section, which is limited to reports from a single State, the rates and percentage of decrease are not dissimilar to those found in table 1.

GEOGRAPHICAL DISTRIBUTION

The highest mean annual death rates from heart disease among persons 5-24 years of age during 1922–36 were encountered in the Middle Atlantic States, where the rates were higher than in New England, long supposed to have the highest incidence of rheumatic heart disease (table 1). The Mountain and the East North Central States, too, have a higher reported mortality from heart disease during the age period under study than New England. The Pacific Coast, South Atlantic, West North Central, East South Central, and West South Central States follow New England in the order mentioned.

Utah, New York, New Jersey, Colorado, the District of Columbia, Pennsylvania, Illinois, and Massachusetts had the highest rates, in the order listed. All of these States had death rates from heart disease of over 20 per 100,000 population among persons 5–24 years of age during the 15-year period. The exceptionally high-rate in Utah is in accord with the clinical studies of Viko (*8*) who found that 44 percent of heart disease among clinic, hospital, and private patients seen at Salt Lake City was of the rheumatic type. He noted that even among patients in rural areas 39.3 percent had rheumatic heart disease as compared with 49.4 percent of patients from Salt Lake City. This high incidence is probably influenced by the younger age distribution of the population. The death rate from all heart disease in Utah is relatively low.

A high rate of endocarditis was found among draftees from Utah during the World War. Love and Davenport (*9*) state that Utah ranked next to the State of Washington in rejections from this cause. The high incidence of endocarditis, acute articular rheumatism, and chronic tonsillitis in Utah was observed during a child health survey conducted by the United States Public Health Service during 1921 (*10*).

Table 2.—*Death rates per 100,000 population from heart disease among persons 5–24 years of age by geographic sections of the United States, based on 36 States and the District of Columbia comprising the U. S. registration States in 1922*

Section	Number of United States registration States in 1922	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	Mean annual death rate 1922–29	Estimated mean annual death rate 1930–36	Percent of decrease 1930–1936 as compared with 1922–29
New England	6	20.1	19.0	21.7	22.8	19.9	22.1	18.5	18.6	16.6	15.8	14.6	13.7	13.8	12.6	13.2	20.3	14.3	29.6
Middle Atlantic	3	27.4	28.1	29.8	29.5	26.7	27.5	26.1	26.2	23.4	21.8	20.6	20.3	18.0	19.0	17.6	27.6	20.1	27.2
East North Central	5	19.5	20.3	20.6	20.3	20.1	19.8	18.8	19.1	16.7	15.8	13.7	14.2	13.3	13.7	12.9	19.8	14.3	27.8
West North Central	4	14.9	13.9	16.4	15.0	13.4	14.7	13.7	13.6	12.4	12.0	10.9	9.4	10.2	10.4	9.8	14.4	11.7	18.8
South Atlantic	[1] 7	15.1	15.5	15.3	15.4	16.2	14.9	14.5	15.5	15.4	14.0	12.9	11.4	12.1	11.0	12.5	15.3	12.7	17.0
East South Central	3	10.8	10.9	11.6	11.0	11.1	10.5	11.0	10.6	11.2	10.6	9.4	8.8	9.6	8.9	8.8	10.9	9.6	11.9
West South Central (Louisiana only)	1	10.4	11.0	13.9	12.3	12.8	13.7	13.3	13.0	14.2	12.0	9.1	12.6	12.9	12.3	12.1	12.6	12.2	3.2
Mountain	5	27.6	23.1	24.5	25.2	25.4	25.7	23.8	24.4	23.1	19.9	18.9	19.1	17.2	20.3	19.1	25.0	19.6	21.6
Pacific	3	17.9	17.6	20.4	15.5	15.9	16.2	14.5	14.8	13.9	13.2	13.0	10.3	9.8	9.8	11.1	16.5	11.6	29.7
Total	[1] 37	19.7	19.8	21.1	20.5	19.5	19.8	18.7	18.9	17.4	16.3	14.9	14.4	13.7	13.9	13.6	19.7	14.9	24.4

[1] Including the District of Columbia.

The high mortality rate from heart disease among persons 5–24 years of age in Utah is at variance with many of the current views concerning the geographic distribution and climatic factors predisposing to rheumatic infection. According to popular conception, rheumatic heart disease occurs most frequently in a cold, damp climate, and in places of low altitude. The climate of Utah is not excessively cold and the variations in temperature by no means as great as in the midwestern plains or eastern seaboard. It has the third lowest mean annual precipitation of any State in the Union, ranking next to Arizona and Nevada. The mean annual precipitation is about 11 inches; even at Salt Lake City it is only about 16 inches. The sun shines about 70 percent of the possible number of hours. The lowest elevation is about 4,000 feet above sea level. Furthermore, it is largely an agrarian State, having only one city of over 100,000 population.

The high rate in the District of Columbia is probably due to the large colored and entirely urban character of the population. The District of Columbia should be considered as a city rather than as a State. The mortality rate in the District of Columbia may be increased to a certain extent because of the large number of hospitals which draw nonresident patients from the surrounding parts of Virginia and Maryland. It is doubtful if this is an important factor. According to a report of the Bureau of the Census for 1936 (*11*), 54.8 percent of deaths from all causes in the District of Columbia occurred in hospitals, as compared with 50.2 percent in cities of over 100,000 population. Of these deaths in hospitals, 17.8 percent were among nonresidents of the District of Columbia. This is not high in comparison with other cities. Furthermore, heart disease ranks low among the causes of nonresident deaths.

In table 3 is shown the mean annual mortality rate per 100,000 population among persons 5–24 years of age during the 3-year period 1930–32 inclusive, based on the 1930 census, in cities of over 100,000 population. According to this table, the following 20 cities had the highest death rates from heart disease in this age group:

City	*Rate per 100,000 persons*
Buffalo, N. Y	40. 3
Jersey City, N. J	34. 6
Pittsburgh, Pa	34. 3
Salt Lake City, Utah	33. 6
Boston, Mass	31. 3
Paterson, N. J	29. 8
Scranton, Pa	28. 5
Denver, Colo	28. 4
Spokane, Wash	28. 0
New York City	28. 0
Fort Wayne, Ind	27. 7
Chicago, Ill	27. 2

City	*Rate per 100,000 persons*
Washington, D. C	26. 4
Springfield, Mass	26. 3
Jacksonville, Fla	26. 1
Elizabeth, N. J	25. 9
Philadelphia, Pa	25. 7
Hartford, Conn	25. 3
El Paso, Tex	25. 0
Memphis, Tenn	25. 0

In general, the cities with the highest mortality rates are located in the northern part of the country. Deaths of nonresidents may have influenced the rates for Salt Lake City and Denver, but it is doubtful whether this is an important factor (*11*).

Comparing table 1 and table 3, the mean annual death rates from heart disease among persons 5–24 years of age in large cities for the period 1930–32 was generally higher than in the States and geographic sections in which the cities are located. The mean annual death rate from heart disease in all cities over 100,000 population during this period was 22.5 per 100,000 population as compared with approximately 15.4 per 100,000 population in the country as a whole, based on the census of 1930. This indicates the importance of urbanization in relation to mortality from heart disease in this age period.

TABLE 3.—*Number of deaths from heart disease among persons 5–24 years of age during 1930–36 in cities of over 100,000 population in the United States and the mean annual death rate from heart disease per 100,000 persons 5–24 years of age during 1930–32, based on United States Census of 1930*

Geographical section and city	Number of deaths among persons 5-24 years of age							Mean annual death rates, 1930–32
	1930	1931	1932	1933	1934	1935	1936	
NEW ENGLAND	211	204	204	185	201	190	199	23. 3
Boston	84	80	88	67	79	79	69	31. 3
Cambridge	2	4	8	3	4	10	13	11 8
Fall River	8	7	3	13	7	7	6	13 5
Lowell	6	11	4	15	9	5	9	19 7
Lynn	7	5	3	4	4	0	4	14. 4
New Bedford	6	9	4	2	14	5	11	15. 4
Somerville	8	4	5	5	5	8	9	16. 0
Springfield	10	14	16	12	18	12	16	26. 3
Worcester	12	13	13	15	12	10	10	18. 5
Providence	21	19	24	17	12	16	14	23. 4
Bridgeport	12	13	8	9	14	9	12	20. 1
Hartford	14	13	17	7	9	16	15	25. 3
New Haven	21	12	11	16	14	13	11	24. 1
MIDDLE ATLANTIC	1, 299	1, 203	1, 174	1, 161	1, 035	1, 074	1, 008	27 2
Albany	10	8	9	4	3	10	7	23 1
Buffalo	53	46	65	46	43	40	31	40 3
New York, total	724	671	653	663	604	595	544	28. 0
White	680	620	605	615	557	549	489	27. 2
Colored	44	51	48	48	47	46	55	45. 0
Rochester	27	21	25	16	16	18	21	21. 7
Syracuse	13	15	16	14	11	13	13	20. 8
Utica	8	11	5	10	4	8	6	22. 2
Yonkers	11	12	13	14	9	6	7	24. 3
Camden	9	10	6	8	9	15	15	18 2
Elizabeth	10	12	12	14	10	11	5	25. 9
Jersey City	39	46	40	37	43	41	37	34. 6

TABLE 3.—*Number of deaths from heart disease among persons 5–24 years of age during 1930–36 in cities of over 100,000 population in the United States and the mean annual death rate from heart disease per 100,000 persons 5–24 years of age during 1930–32, based on United States Census of 1930*—Continued

Geographical section and city	Number of deaths among persons 5-24 years of age							Mean annual death rates, 1930-32
	1930	1931	1932	1933	1934	1935	1936	
MIDDLE ATLANTIC—continued.								
Newark, total	51	33	26	53	37	44	42	22.0
White	43	32	25	45	35	38	34	21.8
Colored	8	1	1	8	2	6	8	23.5
Paterson	19	15	10	8	11	19	9	29.8
Trenton	7	13	11	13	11	12	15	22.2
Erie	11	5	11	9	7	8	11	20.4
Philadelphia, total	193	171	168	143	144	138	150	25.7
White	171	148	144	119	126	119	112	25.1
Colored	22	23	24	24	18	19	38	31.2
Pittsburgh, total	93	87	76	83	56	79	74	34.3
White	85	74	68	75	49	74	66	33.3
Colored	8	13	8	8	7	5	8	45.0
Reading	6	7	14	6	7	5	10	22.8
Scranton	15	20	14	20	10	12	11	28.5
EAST NORTH CENTRAL	778	735	578	666	587	653	614	21.1
Akron	12	11	11	11	8	10	11	11.9
Canton	6	6	4	9	5	8	6	14.0
Cincinnati, total	18	25	26	18	28	37	26	15.9
White	14	20	16	14	24	28	22	13.0
Colored	4	5	10	4	4	9	4	39.0
Cleveland, total	75	65	52	65	63	46	60	19.1
White	67	57	42	62	59	46	53	17.7
Colored	8	8	10	3	4	0	7	36.5
Columbus, total	29	18	16	17	16	21	21	22.2
White	25	16	11	12	13	14	20	20.6
Colored	4	2	5	5	3	7	1	34.5
Dayton	8	4	14	11	15	6	8	12.7
Toledo	23	14	14	23	5	13	13	17.2
Youngstown	12	13	6	7	12	14	24	15.5
Evansville	8	4	3	2	10	4	14	14.2
Fort Wayne	15	9	9	11	8	8	10	27.7
Gary	12	3	7	5	5	7	5	19.2
Indianapolis, total	18	27	13	22	21	19	26	16.2
White	16	24	11	21	16	17	20	17.1
Colored	2	3	2	1	5	2	6	15.7
South Bend	6	4	4	4	2	9	5	12.1
Chicago, total	349	347	264	304	262	285	258	27.2
White	310	307	243	272	224	247	221	23.8
Colored	39	40	21	32	38	38	37	41.6
Peoria	4	1	6	5	6	3	5	10.7
Detroit, total	120	133	89	116	89	111	89	20.5
White	101	116	78	105	76	99	78	18.1
Colored	19	17	11	11	13	12	11	37.8
Flint	5	12	6	6	3	8	8	13.1
Grand Rapids	14	9	5	3	9	9	3	15.6
Milwaukee	44	30	29	27	20	35	22	16.8
WEST NORTH CENTRAL	175	180	149	137	141	127	128	19.0
Duluth	7	4	7	1	6	4	3	16.4
Minneapolis	26	18	23	18	23	17	18	14.3
St. Paul	21	12	14	9	10	9	14	16.9
Des Moines	8	7	6	5	8	11	12	14.3
Kansas City, Mo., total	31	33	20	21	25	15	19	22.6
White	22	25	15	16	21	13	16	18.4
Colored	9	8	5	5	4	2	3	61.9
St. Louis, total	52	71	56	53	43	49	40	22.2
White	42	56	46	47	37	40	30	20.1
Colored	10	15	10	6	6	9	10	39.6
Omaha	17	14	14	11	12	13	14	20.4
Kansas City, Kans	7	19	7	11	9	9	7	24.7
Wichita	6	2	2	5	5	0	1	8.4
SOUTH ATLANTIC	159	165	164	142	147	137	157	19.9
Wilmington	6	9	11	10	9	7	10	22.7
Baltimore, total	52	43	54	40	45	48	49	17.4
White	40	34	42	36	30	39	39	16.4
Colored	12	9	12	4	15	9	10	22.1
Washington, total	37	42	42	33	43	31	31	26.4
White	17	25	26	15	21	14	13	21.2
Colored	20	17	16	18	22	17	18	38.7
Norfolk, total	9	11	12	11	10	8	11	22.4
White	2	6	5	5	4	2	3	13.6
Colored	7	5	7	6	6	6	8	38.9

TABLE 3.—*Number of deaths from heart disease among persons 5–24 years of age during 1930–36 in cities of over 100,000 population in the United States and the mean annual death rate from heart disease per 100,000 persons 5–24 years of age during 1930–32, based on United States Census of 1930*—Continued

Geographical section and city	Number of deaths among persons 5-24 years of age							Mean annual death rates, 1930-32
	1930	1931	1932	1933	1934	1935	1936	
SOUTH ATLANTIC—continued.								
Richmond, total	9	16	5	7	5	12	13	15.0
White	3	9	1	3	1	5	5	9.2
Colored	6	7	4	4	4	7	8	28.2
Jacksonville, total	12	10	15	5	8	6	5	26.1
White	3	5	4	3	2	3	1	13.8
Colored	9	5	11	2	6	3	4	45.4
Miami, total	3	7	1	12	4	5	6	10.1
White	2	4	1	9	2	2	4	8.5
Colored	1	3	0	3	2	3	2	13.5
Tampa	7	4	6	3	6	3	4	14.7
Atlanta, total	24	23	18	21	17	17	28	20.9
White	12	3	3	6	3	3	13	8.5
Colored	12	21	15	15	14	14	15	42.9
EAST SOUTH CENTRAL	91	79	74	67	74	65	69	18.6
Louisville, total	17	20	20	21	19	13	18	18.3
White	11	17	14	16	15	10	13	15.6
Colored	6	3	6	5	4	3	5	34.2
Chattanooga, total	9	6	7	8	11	4	9	15.5
White	4	4	4	7	7	1	5	11.7
Colored	5	2	3	1	4	3	4	25.3
Knoxville	7	5	5	4	3	1	4	13.7
Memphis, total	24	27	15	8	13	18	21	25.0
White	5	14	8	3	4	6	12	16.3
Colored	19	13	7	5	9	12	9	39.7
Nashville, total	7	5	8	8	15	12	6	11.8
White	6	3	5	4	9	9	4	11.4
Colored	1	2	3	4	6	3	2	12.8
Birmingham, total	27	16	19	18	13	17	11	20.8
White	9	12	7	6	5	7	7	15.3
Colored	18	4	12	12	8	10	4	29.1
WEST SOUTH CENTRAL	99	94	94	110	95	96	96	14.2
New Orleans, total	29	30	30	42	31	36	35	17.8
White	15	11	11	18	15	21	16	10.4
Colored	14	19	19	24	16	15	19	35.5
Oklahoma City	8	11	12	11	14	14	9	15.1
Tulsa	7	7	5	8	6	5	5	12.5
Dallas, total	13	8	8	11	13	10	17	10.5
White	9	2	4	6	10	5	12	6.5
Colored	4	6	4	5	3	5	5	28.9
El Paso, total	12	7	11	9	6	9	6	25.0
White	1	3	5	4	1	8	6	9.3
Colored	11	4	6	5	5	1	0	88.4
Fort Worth, total	7	6	6	10	5	4	10	10.6
White	5	3	5	8	4	4	7	8.6
Colored	2	3	1	2	1	0	3	20.9
Houston, total	14	15	9	7	8	13	9	11.9
White	10	8	5	5	4	6	1	9.9
Colored	4	7	4	2	4	7	8	17.2
San Antonio, total	9	10	13	12	12	5	5	11.9
White	7	9	13	10	11	5	4	21.2
Colored	2	1	0	2	1	0	1	2.4
MOUNTAIN	43	46	45	43	45	38	37	30.4
Denver	26	26	26	28	23	24	16	28.4
Salt Lake City	17	20	19	15	22	14	21	33.6
PACIFIC	171	168	164	123	131	127	134	17.0
Seattle	18	13	20	12	12	10	11	15.0
Spokane	17	9	6	6	6	7	10	28.0
Tacoma	4	5	8	4	6	5	6	16.0
Portland	15	20	17	13	13	16	18	18.5
Long Beach	3	1	4	4	4	4	1	6.7
Los Angeles, total	55	61	55	38	53	48	41	15.9
White	47	48	41	29	44	40	39	15.3
Colored	8	13	14	9	9	8	2	18.7
San Diego	8	6	7	8	3	6	8	15.8
San Francisco, total	29	37	35	25	26	21	24	19.2
White	26	33	31	24	23	18	24	18.4
Colored	3	4	4	1	3	3	0	28.6
Oakland	22	16	12	13	8	10	15	18.9
Total	3,026	2,874	2,646	2,634	2,456	2,507	2,442	22.5

Referring to table 3, it should be noted that there was a numerical decline in deaths from heart disease among persons 5–24 years of age in most of the cities over 100,000 population during the period 1930–36. On the basis of geographic sections a decline was noted in the New England, Middle Atlantic, East North Central, West North Central, East South Central, and Pacific Coast States. In the South Atlantic, West South Central, and Mountain States, the number of deaths remained about the same. While numerical incidences can be regarded as only provisional figures, it seems evident that there has been a downward trend in urban communities and that mortality from rheumatic heart disease in young persons has continued to decline during the economic depression. This is in agreement with the experience of the past few years with death rates in general and mortality from infectious diseases in particular.

RACIAL DISTRIBUTION

The influence of race on mortality from heart disease among persons 5–24 years of age is shown in figure 1, a map showing mortality by States during 1922–29. This map also throws additional light on the geographical distribution. The highest rates were found in Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, the District of Columbia, Michigan, Illinois, Wyoming, Utah, and Colorado. The combined rates for white and colored in the Southern States, while lower than in the Middle Atlantic and New England States, are nearly as high as in the Midwestern States (see table 1).

When the rates in the Southern States are broken down to show mortality by race, it is noted (fig. 1) that the death rate from heart disease among white persons 5–24 years of age is appreciably lower than the rates for both races in other parts of the country, especially the Middle Atlantic and New England States. The death rate in the deep South among white persons 5–24 years of age is approximately one-third that of all races in States along the eastern seaboard north of Maryland. The death rate from heart disease among colored persons 5–24 years of age in the South nearly equals that of the total population (mostly white) in other parts of the country.

During the 8-year period 1922–29 the death rate from heart disease among white persons 5–24 years of age in the 9 Southern States and the District of Columbia in the registration area (see fig. 1) was 10.3 per 100,000 population, while the rate among colored persons was 20.5 per 100,000 population, about twice as high. The death rate for both races in these States was 12.5 per 100,000. While it was not possible to obtain detailed information concerning mortality by color in other States, the Bureau of the Census furnishes this information for the registration States of 1920 in appendices to its annual reports.

Based on these figures the mean annual death rate from heart disease among white persons 5–24 years of age was 19.3 per 100,000 population, while the death rate among colored persons was 24.1 per 100,000

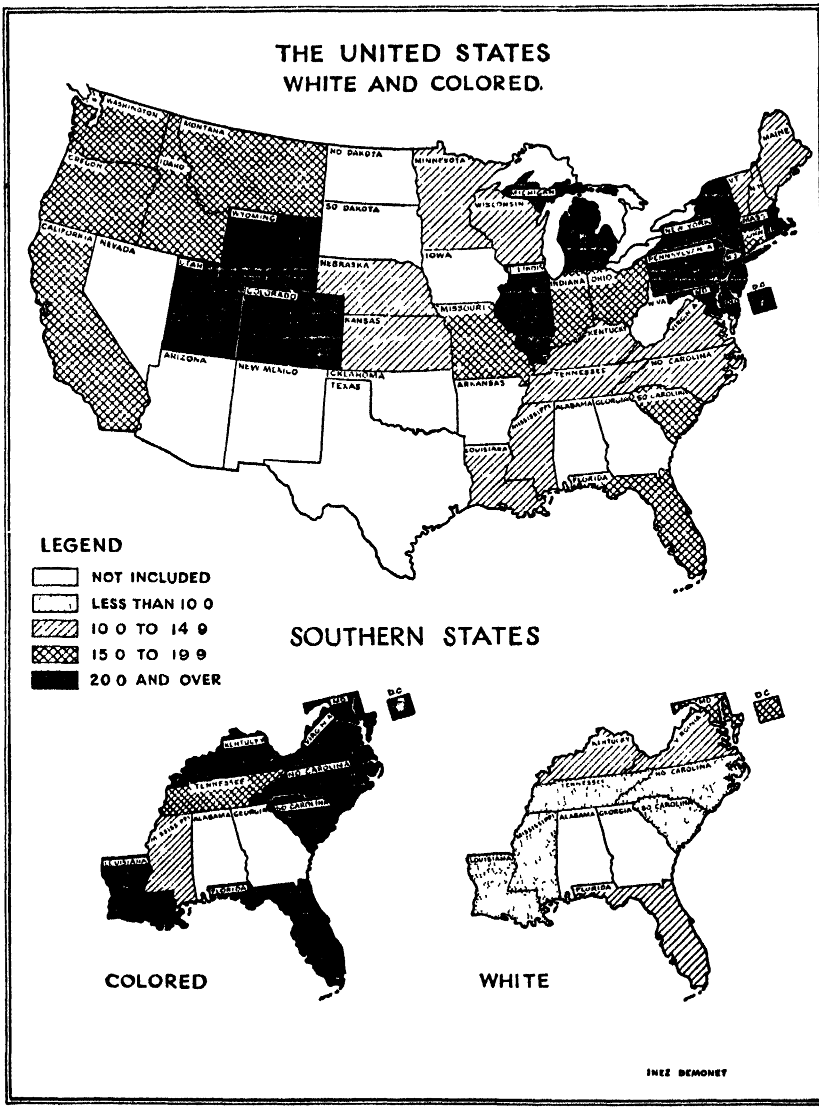

FIGURE 1.—Mean annual mortality from heart disease per 100,000 persons 5–24 years of age in the United States during 1922–29, based on the registration States of 1922. In 9 Southern States and the District of Columbia, death rates among white and colored populations are shown. In the figure for the entire United States the rates are shown for the population without respect to color.

population; for all races it was 19.8 per 100,000 population. By subtracting deaths occurring in the Southern States from the total registration States of 1920, it is possible to determine the rates in the

remainder of these registration States comprising largely the Middle Atlantic, New England, and East North Central States, which are the most populous States, and some States west of the Mississippi, most of which have very small colored populations. In the registration States of 1920 exclusive of the South, the death rate from heart disease among white persons in the age period under study was 21.3 per 100,000 population, while among colored persons it was 34.0 per 100,000 population; for all races it was 21.8 per 100,000 population.

On this basis it should be noted that the mortality among young colored persons is considerably higher than among white persons regardless of geographic location. It should also be noted that the rate among white persons in registration States not in the South was twice that of the Southern States.

According to table 3, the death rates from heart disease among young colored persons in cities of over 100,000 population was higher in nearly every city in which mortality was computed on the basis of race during 1930–32. This was true not only in the South, but also in the large northern cities. Since heart disease mortality among colored persons 5–24 years of age is greater than among white persons in every State and nearly every city in which this computation was made, it cannot be attributed to diagnostic errors peculiar to any part of the country.

These findings are in agreement with those of other writers. Atwater (*12*), Mills (*13*), and Dublin and Lotka (*4*) have noted that mortality from rheumatic fever is higher among colored persons. The experience of the industrial department of the Metropolitan Life Insurance Co. indicates that heart disease mortality is higher among colored persons. Dauer (*14*), in a study not dissimilar in certain respects to this study, also observed a higher mortality from heart disease among young colored persons.

The problem of heart disease among Negroes 5–24 years of age has nowhere received the attention it deserves. Presumably most of these deaths are due to rheumatic heart disease. There is no reason to believe that congenital cardiac diseases are more frequent in the colored race (*15*, *16*). Although the percentage of error in diagnosis is probably higher than that among white persons, this factor is counterbalanced to a certain extent by missed cases.

DISCUSSION

At the present time the cause of rheumatic fever and consequently rheumatic heart disease is unknown. There is no proved method of combating this disease by means of public health measures. Clinical management is frequently unsatisfactory despite certain improvements in treatment during the past decade. Clinicians are more alert to detect early signs of rheumatic infection and to insist upon

prolonged bed rest. The lay public is becoming cognizant of the importance of this disease and is more willing to cooperate in the tedious treatment required to ward off or minimize cardiac damage.

The decline in mortality reported as due to heart disease among persons 5–24 years of age is a source of some satisfaction but it should not blind the reader to the seriousness of the problem. In Philadelphia during 1936 (*17*) there were more deaths from rheumatic heart disease among persons under 20 years of age than from whooping cough, measles, diphtheria, scarlet fever, meningococcus meningitis and anterior poliomyelitis combined during this age period. It resulted in more deaths than pulmonary tuberculosis, and nearly as many as from all forms of tuberculosis in persons less than 20 years of age. In New York City during the 4-year period 1933–36, mortality from heart disease (mostly rheumatic heart disease) exceeded that from all other causes of death among girls 5–14 years of age, while among boys it was exceeded only by accidents. Among males 15–24 years of age it ranked third, exceeded only by tuberculosis of the respiratory system and accidents. Among females 15–24 years of age it was exceeded as a cause of death only by tuberculosis. Collins (*18*) noted that in 1929–30, mortality from heart disease among males 5–14 years of age in the United States was exceeded only by accidents, pneumonia, and appendicitis. Among females 5–14 years of age it was exceeded only by accidents. Among males 15–24 years of age heart disease was exceeded by accidents, tuberculosis, and pneumonia, while among females it was exceeded only by tuberculosis and diseases of the puerperal state.

It is possible that the decline in mortality from heart disease among persons 5–24 years of age during 1930–36 as compared with 1922–29 is not as great as some of these figures (tables 1 and 2) indicate, owing to a fall in birth rate which may result in inaccuracies in estimated populations based on extrapolated percentages. Since the population of the United States is still increasing, but at a slower rate, it seems evident that there has been a significant actual decline in mortality from heart disease.

There is also the possibility that with improvement in diagnostic methods physicians are not as likely to make diagnoses of heart disease as formerly. This has some support in school (*19*) and college surveys (*20*) where it was noted that with more careful examinations, less heart disease was found. The recognition of heart disease in supposedly healthy individuals is not comparable to diagnosis of seriously ill patients. Among students it often rests on the detection of diastolic murmurs, which may be difficult, the determination of cardiac enlargement, which may require roentgen-ray visualization, or the interpretation of systolic murmurs, which requires considerable experience. Heart disease in the bed-ridden patient usually presents

such an unmistakable clinical picture that a diagnosis of heart disease is not difficult except among patients *in extremis*.

On analyzing causes of death, it is necessary to consider the influence of change in diagnostic expressions by physicians and of administrative procedures for classifying and tabulating causes of death. Apparently neither of these factors has participated to any great extent. The decline was not due to more deaths being certified as caused by rheumatic fever. Deaths reported as due to rheumatic fever declined from 3.2 per 100,000 persons 5–24 years of age in 1922 to 2.2 per 100,000 in this age period in 1936. Atwater (*12*) and Dublin and Lotka (*4*) noted that this decline in mortality from rheumatic fever began many years before the beginning of this study.

Granting that there has been a decline in mortality from heart disease among persons 5–24 years of age, and that most of these deaths are due to rheumatic heart disease, it appears desirable to consider possible causes for this decline. Here is a disease in which there seems to have been a certain reduction in mortality despite the fact that the cause is unknown. Organized preventive measures on an adequate scale have not been instituted, and clinical treatment is frequently unsatisfactory. Such a situation is not, however, unique in the annals of medical history. Tuberculosis, leprosy, and scarlet fever were declining in incidence or severity before their etiology was determined or control measures begun. The experiences of the United States Army and Navy (*21*) and the British Army and Navy (*22*) indicate declines in the incidence of acute rheumatic fever.

Were the factors responsible for the apparent decline in mortality from rheumatic heart disease better understood it might be possible to take advantage of them to accelerate a further decline. Experience with other diseases has shown that it is not necessary to obtain perfection in preventive methods to break the backbone of a disease as a public health problem. For instance, while 100 percent immunization against smallpox or diphtheria is highly desirable, these diseases can be controlled as major public health problems without approaching this ideal.

The following possibilities are suggested as responsible in varying degrees for the decline in mortality from heart disease among persons 5–24 years of age:

1. Rheumatic fever may be becoming milder, resulting in less heart disease or less severe heart disease with fewer deaths during this age period. It is the impression of many of the older clinicians that this is true. The classical picture of rheumatic fever described in the older textbooks is not commonly seen today.

2. Diagnosis and treatment of rheumatic fever and rheumatic heart disease may have improved to the extent that fewer cases of severe heart disease are developing, or at least more lives are being

prolonged. This is probably an important factor and will require additional studies. It is notable that the decline in mortality has been most precipitous in parts of the country in which physicians are more alert to this problem.

3. Widespread removal of diseased tonsils may be in part responsible for this decline. Much has been written pro and con during the past 15 years on the value of tonsillectomy in the prevention or treatment of rheumatic fever. Much of this discussion seems beside the point. Although many tonsils have been removed needlessly since the beginning of the present century, many a child's health has been improved by the enucleation of diseased tonsils. Furthermore, the effects of tonsillectomies on a large scale may now be affecting the second generation. There is some reason to believe that rheumatic fever is often spread within the family group (*23*). Young children are less often exposed to parents with quinsy and other forms of acute or chronic tonsillar infection than a generation ago.

4. There may be some factor in the changing diet of the American people that is responsible for the reduction in mortality presumably from rheumatic heart disease during this age period. Although efforts have been made to incriminate lack of vitamins or minerals as causative factors, these have not been successful. The field has not been fully explored. Most students of this disease believe that rheumatic fever, especially in its more fulminating forms, is more common among the poorer classes. The high mortality from heart disease among Negroes 5–24 years of age in the North as well as in the South supports this view.

There is no denying that greater attention is being paid to the diet of young children, even of the poorer classes, than a generation ago. The reduction in the visible effects of rickets is a case in point. While the diets among the poorer classes often do not contain optimum vitamin, mineral, and protein requirements, there has been some improvement as witnessed by increased consumption of dairy products.

5. Although more difficult to evaluate at the present time, improvement in housing may be in part responsible for this apparent decline. Owing to better transportation facilities more families are living in the suburbs. In the heart of cities, among the extremely poor, housing conditions do not seem to have improved during the period 1922–36. In fact, regression has probably occurred, since slums are essentially dwellings occupied by people with incomes insufficient to prevent depreciation of property. If slum clearance in the United States is ever conducted on a large scale, well-controlled studies should be made to determine the effects of this measure on rheumatic fever. Due regard should be paid to the possibility that rentals may be so high that poor families may have to reduce their standards of living in other respects.

6. The decline in mortality from heart disease among persons 5–24 years of age may be attributable to more careful attention to general health problems of children. It is a well-known public health observation that improvement in water supply often results in a decline in diseases not directly due to water-borne infections. Similarly, it is possible that better child hygiene may favorably influence certain diseases.

To the student of rheumatic fever the millennium is constantly fading. At present the horizon may be scanned in vain for even an indication that an active immunizing agent may be forthcoming in the near future. Since the turn of the century many microorganisms—streptococci, filterable viruses, and recently pleuropneumonia-like microorganisms—have been suggested by various research workers as factors responsible for the pathogenesis of this disease. Based on experience with other chronic infections and the nature of these organisms it appears not unlikely that were any of them proved to be the cause of rheumatic fever, it might still be impossible to solve this problem by active immunization. The chronic nature of rheumatic infection, its tendencies to recurrences and recrudescences, its insidiousness and the protean characteristics of its clinical manifestations all militate against this likelihood.

This is not to be interpreted as an attempt to deprecate the value of researches directed at unravelling the microbiology of this disease. Compared to other diseases too little is being done. All the money and effort expended in these endeavors would be fully justified by the development of a simple objective test for rheumatic infection, even though no preventive or therapeutic measures resulted.

It is doubtful to what extent the reduction in human tuberculosis has been dependent upon the discovery of the microbacterium of tuberculosis or the practical application of bacteriological principles. Even the tuberculin test has at no time been indispensable or of as much value as other diagnostic measures concurrently employed. The causes of the reduction of human tuberculosis are still not fully understood. It seems to be due to an attenuation of the severity of tuberculosis or to the development of some sort of natural immunity by certain racial groups for some unexplained reason, together with better living conditions, earlier diagnosis, isolation of patients with open sources of infection, and progressive improvement in medical and surgical therapeutic procedures.

In this apparent reduction in mortality from rheumatic heart disease there is at least a ray of hope. Is it not possible that by the intelligent application of methods now at the disposal of the medical profession the tendency toward decline could be given a further impetus? The writer is of the opinion that researches should be directed along these lines.

With regard to the geographic distribution, mortality from heart disease among white persons 5–24 years of age appeared to be less common (table 1 and figure 1) in the South than in the North. The difference is not as great as might have been expected. To a certain extent the medical writers of the North have been educating the physicans of the South not to look for rheumatic heart disease. In the South Atlantic, East South Central, and West South Central States the mean annual mortality rates from heart disease among white persons 5–24 years of age ranged from 6.9 in Mississippi to 19.7 in Maryland. In most States in the deep South it ranged from 7 to 10 per 100,000 population. While this is less than in the New England and Middle Atlantic States, it is possible that climate is not the only responsible factor.

Many clinicians have the impression that rheumatic heart disease is less common among Negroes than white persons. This is based on reports from a few clinics in the South and may be due to a higher incidence of other forms of heart disease rather than to a lower incidence of rheumatic heart disease. Furthermore, these studies do not take into consideration that, even in the South, colored persons usually account for a smaller proportion of the population. It is probable that many colored persons are unable to attend clinics for minor grades of heart disease because clinics may not be available, because they have to work, because their parents have to work and are unable to bring them, and for financial reasons.

Carefully conducted surveys of heart disease among both white and colored children in Southern States are sorely needed to determine the incidence of rheumatic heart disease. School medical examinations have never been utilized to the fullest extent of their potentialities as a public health weapon or for case finding in any disease.

SUMMARY

1. Since most deaths from heart disease among persons 5–24 years of age are due to rheumatic heart disease, the use of mortality rates during this age period is suggested as an index of trends and the racial and geographical distribution of mortality from rheumatic heart disease.

2. The estimated mean annual death rates among persons 5–24 years of age during 1930–36 were less than the mean annual rates during 1922–29 in every section of the country and in every State in the registration States. For the registration States a decrease of 27.6 percent was indicated. While these decreases may not have been as great in some States as indicated, because of doubtful population estimates, there seems to be little doubt that there has been a substantial reduction in heart disease mortality among persons 5–24 years of age during the 15 years under study.

3. In the United States as a whole there has been since 1930 a numerical decrease in deaths from heart disease among persons 5–24 years of age. In the original registration area and in the States comprising the registration area in 1922 there has been a decline in the number of deaths in this age period since about 1925.

4. The decline in both numbers of deaths and death rates from heart disease among persons 5–24 years of age has been more marked since 1930. Mortality from heart disease has continued to decline during the recent economic depression.

5. While the decline has been general throughout the United States, it has been greater in those parts of the country in which the greatest attention has been paid to rheumatic heart disease.

6. The death rates from heart disease are higher among colored persons 5–24 years of age in every State and nearly every city in which deaths are tabulated according to color. Since this applies to the cities of the North as well as the cities and States of the South it is interpreted as indicating a higher mortality rate from rheumatic heart disease among young Negroes.

7. Death rates from heart disease were appreciably lower among white persons 5–24 years of age in the deep South than for both races in the Middle Atlantic and New England regions (mostly white) and among the white populations of most southern as compared with northern cities.

8. Rates in cities of over 100,000 population tended to be significantly higher than the States and geographical sections in which they are located. This was especially evident in cities of over 500,000 population. It is doubtful whether deaths of nonresidents are a very important factor. Large colored populations probably adversely influence mortality rates from heart disease among persons 5–24 years of age in the larger cities.

9. The need for school surveys of heart disease, especially in the South, is emphasized.

10. Researches should be conducted to determine the reason for this apparent decrease in mortality from rheumatic heart disease among young persons, with the view to accelerating further the decline.

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CHLOROPICRIN AS A PREWARNING GAS IN SHIP FUMIGATION

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The fumigation of ships with such a highly lethal gas as hydrocyanic acid presents certain hazards to human life which can be obviated only by the personnel so engaged exercising the utmost care in the performance of their duties and by the use of any and all available mechanical and chemical precautions.

Past experience has shown that the greatest single hazard is the presence of unauthorized persons hidden in unusual and remote places in the ship's superstructure or inaccessible parts of the ship's holds where they are protected from observation by cargo or excess dunnage. Despite painstaking searches by the ship's crew and by the fumigating crew, such persons are sometimes undetected. In order to minimize this hazard, studies were undertaken at the New York Quarantine Station for the purpose of developing a practical method of applying a prewarning gas immediately preceding the introduction of the lethal

gas, which would act in such a manner as to bring any hidden person into the open without at the same time subjecting him to a harmful concentration of gas.

Of the various gases studied, chloropicrin seemed to offer the greatest possibilities for the reason that an irritating effect could be produced which was unbearable in a concentration far below the lethal dosage. The application of this gas in the form of chloropicrin discoids was found to have three satisfactory features: (1) The final and ultimate concentration of gas was not reached too quickly, thus permitting sufficient time for movement and egress by a person in hiding before the full irritating effect on the eyes was attained; (2) eth operator could determine fairly exact dosages simply by counting the discoids introduced; (3) the danger of chemical burns was minimized.

Description.—Chloropicrin discoids are lightly compressed, wood fiber disks, 3½ inches in diameter and averaging one-tenth inch in thickness, in which is absorbed liquid chloropicrin up to a degree of saturation which permits the absorbent to retain all the liquid after being hermetically sealed within a metal container.

Prewarning period.—Past experience has shown that in ship fumigation the most practical prewarning period is the 30-minute interval immediately preceding the introduction of the hydrocyanic acid gas. This is sufficient time to permit chloropicrin to diffuse and exert its full irritating effect, but does not materially prolong the time necessary for fumigation. In the tests with which this report deals, all determinations have been based on a 30-minute prewarning period.

Tests.—Some of the tests were undertaken on shipboard during the course of actual fumigation and others were applied in a compartment ashore in which heating facilities permitted variations in temperature.

In the conduct of tests on board ships, the observer remained in the bottom of the hold or as far down as the position of the cargo would permit while the chloropicrin was being introduced through an opening at one corner of the covered hatch. The observer remained in this position as long as he could without using a gas mask. To afford a classification of the effects on man, three degrees of irritation were arbitrarily selected, as follows:

1. A slight effect corresponding to a faint odor and beginning lachrymation, but without the production of enough discomfort to cause withdrawal in 30 minutes.

2. Sufficient concentration of gas to produce a definitely disagreeable odor and taste accompanied by moderate irritation and lachrymation, causing the observer to withdraw after 5 or 10 minutes' exposure.

3. Sufficient concentration of gas to produce irritation and lachrymation of such intensity as to force immediate withdrawal by the observer and to prevent entrance to the compartment without the protection of a gas mask.

In determining the rate of effusion of gas from chloropicrin discoids, a series of tests was undertaken in a room containing 3,546 cubic feet of air space. The method of procedure was to expose discoids on a prearranged flat surface resting on a carefully balanced scale. Weight readings were taken at the beginning of the tests and at 10-minute intervals up to and including 30 minutes. The residue was then preserved and reweighed at intervals until no further loss of weight was registered. From a computation of figures obtained in these tests, the percentage of chloropicrin evolved during each succeeding 10-minute interval was calculated and the lachrymatory effect noted. The following tables give the results of prewarning tests conducted on shipboard and of evaporation tests undertaken on shore.

TABLE 1.—*Time in which slight, moderate, and pronounced warnings are conveyed by chloropicrin to persons in ship's compartments containing different cargoes (prewarning tests on ships (discoids))*

Number of test	Compartment tested	Temperature, °F.	Cubic feet of space per ounce [1]	Time, in minutes, for prewarning: Slight	Moderate	Pronounced	Cargo
1	Hold	30	21,357	4	30		None.
2	do	43	10,264	5	10		Do.
3	do	43	2,411	1	3	5	Cocoa beans and wax.
4	do	44	5,098	4	12	20	None.
5	do	45	6,944	5	10	24	Do.
6	do	47	6,950	3	5	9	Tobacco.
7	Forepeak	50	2,750			12	Excess dunnage.
8	'Tween deck	50	5,568	5	10	20	Linseed.

[1] Reference to table 2 will indicate the amount of chloropicrin probably actually liberated.

TABLE 2.—*Percentage of chloropicrin, by weight, evolved from discoids in 10, 20, and 30 minutes under varying temperatures*

Number of tests made	Temperature range, °F.	Average percent chloropicrin: 10 minutes	20 minutes	30 minutes	Number of tests made	Temperature range, °F.	Average percent chloropicrin: 10 minutes	20 minutes	30 minutes
3	31-34	6.6	10.3	17.0	3	58-62	16.0	26.0	37.3
2	35	6.8	12.0	16.6	2	65-70	16 8	33.7	55 0
2	39-41	5.0	10.2	14.4	2	73-74	17.8	34.5	50.0
2	51	17.3	31.0	46.5	3	78-82	18.0	36.0	54 6

In conducting the evaporation tests there was found to be a significant relationship between temperature and the rate and degree of effusion of gas from the discoids, i. e., the higher the temperature, the more rapid and complete was the effusion within the 30-minute period allotted for the test. This correlation of the rate of effusion with temperature permits an approximation of the gas concentration which may be secured within a 30-minute period.

The discoids used in these tests were taken from the original container without discrimination as to their thickness. A considerable variation was found to occur as to the number of disks per container

and the thickness of the individual disks and weight of chloropicrin contained. It was found that in all tests where the effusion rate did not rise in proportion to the temperature, disks thicker than the average had been used. Effusion from the heavier disks took place at a much slower rate than from the thinner ones. Since these tests were made the manufacturer has overcome a large part of the variation in effusion rate by eliminating the use of the thicker disks.

Tests for toxicity.—In order to establish the probable safety of human life to an adequate prewarning dosage of chloropicrin gas, an attempt was made to obtain information relative to the lethal qualities by conducting tests in which white rats were exposed to varying concentrations of gas generated by spraying liquid chloropicrin into a compartment.

These tests showed that concentrations of less than 1 ounce of chloropicrin gas per 1,000 cubic feet of space was not lethal to rats, and in some instances 2 ounces per 1,000 cubic feet produced no observable symptoms. The rats exposed to 5 ounces per 1,000 cubic feet of air space died within a period of 12 hours. Of the 9 rats exposed to concentrations varying from ⅛ ounce to 2 ounces per 1,000 cubic feet, 8 had no symptoms and were alive and well 1 year after exposure. One rat exposed to a concentration of 1 ounce per 1,000 cubic feet died on the 34th day after exposure with symptoms suggesting a severe pulmonary congestion. However, in considering this fatality, the fact that a rat subjected to a double dosage survived without symptoms suggests that other factors than gas may have been the cause of death.

The minimum lethal dose as indicated by these tests is approximately 16 times greater than the gas concentration recommended in table 3.

Tests were also made to determine what, if any, deleterious effect chloropicrin gas would have on edible foods ordinarily carried on shipboard. A heavy concentration of 1 ounce per 1,621 cubic feet was produced and such foods as oranges, lemons, apples, carrots, onions, potatoes, radishes, dried prunes, various nuts, tea, coffee, and, in addition, tobacco in the form of cigarettes, were exposed for 3 hours at a temperature of from 64° to 70° F. Neither the taste nor the appearance of any of these food products was altered as a result of the exposure. Tea and coffee were brewed and drunk without ill effect immediately after exposure. The odor and taste of these delicate products were not affected. Generous samples of each of the food products were consumed without ill effect. Cigarettes were smoked 26 minutes after exposure and no change in the odor or taste of the tobacco could be detected.

As a check on the corrosive effect of chloropicrin gas, pieces of polished copper were exposed to the same high concentration of gas and no observable tarnishing resulted.

FIGURE 1.—Method of distributing chloropicrin discoids into recess above cargo in hold of ship.

FIGURE 2.—Man emerging from tank where stowaways were found Arrows indicate section of floor in engine room normally covered by removable steel plates.

The United States Public Health Service has for many years used chloropicrin as a warning gas during and after ship fumigation with hydrocyanic acid gas. Continued and frequent exposure of the fumigators to chloropicrin gas, although sufficient to produce considerable lachrymatory irritation, has never to the writer's knowledge caused any symptoms other than transitory lachrymation.

Dosage.—Based on the data obtained from the various tests performed, a dosing schedule has been developed for chloropicrin discoids which, while not exact, has proved satisfactory in actual ship fumigation. This schedule is recommended as meeting all practical requirements when this material is used for its prewarning effect in connection with fumigation. The following table gives the minimum dosage recommended for each of four ranges of temperature.

TABLE 3.—*Minimum amounts of chloropicrin required to obtain a concentration of 1 ounce to 16,000 cubic feet of space in 30 minutes under varying degrees of temperature*

Temperature, °F.	Dosage per cubic feet of space [1]	Approximate gas concentration in 30 minutes
Below 40°	1 oz. to 3,000	1 oz. to 16,000.
40°-60°	1 oz. to 6,000	Do.
60°-80°	1 oz. to 8,000	Do.
Over 80°	1 oz. to 10,000	Do.

[1] 4½ discoids contain approximately 1 ounce of chloropicrin.

Application.—The use of chloropicrin discoids as a prewarning agent in ship fumigation is accomplished by distributing the required number of discoids into the compartment to be fumigated. Prewarning gas should be distributed at a minimum of 30 minutes prior to the introduction of the fumigant. The dosage is predicated on the temperatures shown in table 3 and the fact that 4½ discoids contain approximately 1 ounce of chloropicrin. The gas should be evenly distributed throughout a compartment. This may be accomplished in a vessel's holds by throwing individual disks by hand over and behind cargo and into cracks and crevices. In distributing chloropicrin discoids, the hands should be protected by wearing either cotton or soft leather gloves in order to prevent chemical burns. Compartments which can be easily inspected and which offer no possibility for the hiding of unauthorized persons need not be treated with a prewarning agent.

Lives saved.—By the use of chloropicrin as a prewarning gas lives have been saved at the port of New York on three occasions. In one case a stowaway emerged from a bunker 20 minutes after the warning gas was introduced and just as the fumigating crew was about to proceed with the fumigation. In the second case 2 stowaways were driven out of the hold of a ship within 5 minutes, while the third instance was the dramatic rescue from fumigation of 10 stowaways

who had been hidden in an empty tank below the engine room. This tank, in an old ship, was not tight but had numerous holes opening into the bunkers through which seeped enough of the warning gas to inform the stowaways of their danger and set them to hammering on the plates above them. The HCN had been introduced into the ship when they were first heard, but the fumigating crew was able to locate them, remove the manhole cover, which had been bolted down, and haul all of them out and to safety before an amount of the fumigating gas sufficient to poison them seriously had seeped into their hiding place. In none of these instances did the victims suffer anything more serious from the fumigation than temporary irritation of the eyes, nose, and throat.

As an illustration of the greater effectiveness of chloropicrin used for prewarning as compared to the same material merely added to the fumigant, a case may be cited which occurred at New York several years ago at a time when the chloropicrin was incorporated in the HCN and introduced with it instead of being used prior to the HCN as described in this paper. A stowaway had been secreted in the crew's quarters and, when these were fumigated, was driven from his hiding place by the irritating effects of the chloropicrin. However, he was unable to save himself because the HCN gas, liberated at the same time as the chloropicrin, rendered him unconscious before he could even reach the door to the deck, a distance of only about 20 feet. By chance a fumigator heard the man fall, rushed in, and hauled him out on deck. He was unconscious, had stopped breathing, and was in convulsions, but by the prompt institution of artificial respiration, his life was saved. After several hours of unconsciousness and 2 days' hospitalization he recovered.

SUCCESSFUL TRANSFER OF THE LANSING STRAIN OF POLIOMYELITIS VIRUS FROM THE COTTON RAT TO THE WHITE MOUSE[1]

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In an earlier paper (*1*) the successful transmission of a strain of poliomyelitis to the eastern cotton rat, *Sigmodon hispidus hispidus*, was recorded. This strain has now been carried through 26 serial transfers in this species to which it has become progressively better adapted. The incubation period has shown a tendency to stabilize at from 3 to 5 days when the inoculating dose is maintained at 0.06 cc. of a 5 percent saline suspension of virus-infected fresh cord and brain, administered intracerebrally. Attempts to transmit the infection by the intranasal route have so far been without success. Cotton rats are apparently quite uniformly susceptible to intracerebral

[1] From the Division of Infectious Diseases, National Institute of Health.

inoculations. Eighty-nine cotton rats of various ages trapped in nature have been inoculated for the purpose of "carrying" the Lansing strain of virus from the seventh to twenty-fifth generations, of which 1 animal died of unknown cause, possibly poliomyelitis, on the fourth day, while of the remaining 88 only 1 failed to develop flaccid paralyses. The clinical and pathological manifestations are more pronounced than in earlier transfers and the majority of rats die within 2 to 4 days after symptoms appear, unless sacrificed earlier.

Intracerebral inoculation into monkeys of brain and cord material (1 cc. of a 5 percent suspension) from the third, sixth, and fifteenth cotton rat transfers was followed by severe clinical and pathological poliomyelitis in all cases.

Three neutralization tests have been attempted employing cotton rats, recent passage strains of the virus, and poliomyelitis antisera, one of which sera (P. C. M. S. XII) was received through the courtesy of Dr. E. H. Lennette, one (M-1791) from Dr. Lloyd Aycock, and one of our own (M-409) from a monkey which had recovered from an attack of poliomyelitis following inoculation with the P. M. strain of virus.

These tests, while of a preliminary experimental character, all indicate that two of the sera possess neutralizing properties for the virus, while the serum from Dr. Aycock's monkey is apparently almost or completely inert. The results of the last trial are shown in detail in table 1. In this test a 1:15 emulsion in buffered saline, pH 7.6, of cord and brain from cotton rats 452 and 453 (23 transfers) was centrifuged at 1,200 r. p. m. for 5 minutes and 1 part of the supernatant fluid was added to 2 parts of the respective sera to be tested. The mixtures were incubated in the hot room at 37.5° C. for 2 hours, then placed at 5° to 8° C. for 45 minutes. Four cotton rats were each inoculated intracerebrally with 0.06 cc. of each serum-virus mixture.

TABLE 1.—*Antipoliomyelitis serum cotton rat virus neutralization test in cotton rats*

Serum source (2 parts)	Virus source (1 part)	Dose of serum virus mixture intracerebrally	Day of paralysis and of death of cotton rats (4 to each serum)	Number of rats alive 12 days
		cc.		
Normal monkey 609	C. R. 452 C. R. 453	0.06	Paralysis: 5, 5, 6, 6 Death: 6, 7, 7, 8	0
M-1791 (Aycock)	C. R. 452 C. R. 453	.06	Paralysis: 6, 5, 5, 6 Death: 7, 6, 6, 7	0
M-409 (N. I. H.)	C. R. 452 C. R. 453	.06	Paralysis: 6, 7, 9 Death: 8, 8, 10	1
P. C. M. S. XII (Lennette)	C. R. 452 C. R. 453	.06	Paralysis: 7 Death: 9	3

Attempts to adapt additional strains of poliomyelitis to the cotton rat are under way. One rat inoculated with our "Bush" strain isolated from a case of poliomyelitis at Niagara Falls, N. Y., in 1938,

developed paralysis in the right front leg, first noted on the forty-first day. Sufficient time has not yet elapsed to indicate whether or not subtransfers will succeed.

TRANSFER OF THE VIRUS TO WHITE MICE

Since it was thought that a strain of virus adapted to the cotton rat might be pathogenic for other rodent species, transfers were made into white mice. Suggestive results were not obtained until 30 days after the seventh cotton rat transfer of virus was so inoculated, when 1 of 5 intracerebrally inoculated mice was found to be paralyzed in the left front paw and left hind leg. The following day, October 20, 1939, the left front and both hind legs were completely paralyzed. Brain and cord emulsion from this mouse was transferred to 4 groups (2 Swiss and 2 ordinary) of 6 half grown to adult white mice and to cotton rat 353. Twelve of the 24 mice developed paralysis in one or more legs in from 3 to 12 days and the cotton rat developed typical symptoms on the eighth day and was completely paralyzed on the tenth day, when it was etherized and the brain and cord submitted for pathological study. Dr. R. D. Lillie reported poliomyelitis similar to that observed in direct cotton rat transfers.

Successful mouse inoculations have now been carried through 12 successive transfers. The virus is showing a tendency to affect a higher proportion of mice in later passages. For instance, of 36 mice inoculated on the ninth transfer, 28 developed paralyses on from the second to twentieth days. An incubation period of 3 to 7 days is most common.

The symptoms in mice consist of flaccid paralysis, most obvious when one or more legs or the respiratory muscles are involved. Except when respiration is affected, the mice usually appear to be sleek and without symptoms other than the paralyses.

Pathological examination of a limited number of affected mice has been made by Surgeon R. D. Lillie, who reports lesions consistent with those of poliomyelitis in other species.

Brain and cord emulsion from the fourth mouse transfer was injected intracerebrally into monkey 610 which developed a continuous fever from the fifth to eleventh days, reaching 41° C. on the sixth and seventh days. The animal was nervous and tremulous, but recovered without paralysis.

Monkey 618, similarly inoculated with sixth mouse transfer virus, developed fever on the fourth day with tremors and definite weakness of the hind legs. The animal was sacrificed on the eighth day and a subinoculation of cord emulsion was made into monkey 620 which developed severe symptoms followed by complete paralysis on the tenth day. Lesions typical of moderately severe and severe poliomyelitis were reported for the respective animals by Pathologist J. H. Peers.

An emulsion of cord from monkey 620 was transferred on December 11, 1939, to cotton rats 459 and 460 and to 5 white mice. The cotton rats developed typical symptoms on December 17 and 18 followed by complete paralysis and death on December 20 and 22, respectively. Up to December 26, 1939, two of the white mice had developed symptoms. One showed flaccid paralysis in both hind legs on December 17 and died on December 22. A second became paralyzed in the left front and right hind leg on December 25 and was still living on December 26.

That the virus in mice is the same as the cotton rat strain is further indicated by the successful transfer of the third, ninth, and eleventh mouse generations of virus again to cotton rats with the development of characteristic symptoms and pathology for that species and by the fact that primary mouse inoculations from the fourteenth, fifteenth, sixteenth, eighteenth, nineteenth, twenty-fourth, and twenty-fifth successive transfers in the cotton rat have uniformly produced flaccid paralysis in a portion of the inoculated mice.

The virus has certain marked similarities to, as well as marked differences from, the spontaneous mouse virus first described by Theiler in 1934 (*2*), with which it is hoped to compare it immunologically in the near future.

SUMMARY

The Lansing strain of poliomyelitis virus after adaptation to the eastern cotton rat has been successfully transmitted through twelve generations in white mice.

REFERENCES

(*1*) Armstrong, Charles: The experimental transmission of poliomyelitis to the eastern cotton rat, *Sigmodon hispidus hispidus*. Pub. Health Rep., **34**: 1719–1721 (1939).
(*2*) Theiler, Max: Spontaneous encephalomyelitis of mice—a new virus disease. Science, **80**: 122–124 (1934).

DEATHS DURING WEEK ENDED DECEMBER 9, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 9, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	8,554	8,818
Average for 3 prior years	[1] 8,695	
Total deaths, first 49 weeks of year	403,584	397,910
Deaths under 1 year of age	488	514
Average for 3 prior years	[1] 529	
Deaths under 1 year of age, first 49 weeks of year	24,323	25,631
Data from industrial insurance companies:		
Policies in force	66,500,419	68,283,468
Number of death claims	12,202	11,995
Death claims per 1,000 policies in force, annual rate	9.6	9.2
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9.9	9.2

[1] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended December 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934-38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934-38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934-38, median
NEW ENG.												
Maine	12	2	23	2	----	----	----	----	314	52	5	42
New Hampshire	0	0	0	0	----	----	----	----	10	1	0	7
Vermont	0	0	0	0	----	----	----	----	281	21	13	13
Massachusetts	6	5	5	5	----	----	----	----	387	329	212	195
Rhode Island	8	1	0	1	----	----	----	----	664	87	1	8
Connecticut	3	1	6	5	3	1	7	5	178	60	68	93
MID. ATL.												
New York	9	22	27	37	[1] 20	[1] 29	[1] 14	[1] 14	170	425	836	662
New Jersey	11	9	19	22	18	15	5	13	25	21	30	54
Pennsylvania	14	27	32	37	----	----	----	----	26	51	67	108
E. NO. CEN.												
Ohio	10	13	34	34	42	54	----	25	21	27	16	129
Indiana	27	18	27	31	39	26	12	35	13	9	10	12
Illinois	29	44	48	48	9	14	14	21	12	18	34	34
Michigan [2]	11	10	16	16	6	6	3	3	413	391	155	155
Wisconsin	0	0	0	2	77	44	44	44	120	68	186	141
W. NO. CEN.												
Minnesota	2	1	1	5	2	1	1	----	252	130	399	47
Iowa	8	4	14	14	14	7	8	4	87	43	111	12
Missouri	17	13	11	35	3	2	62	62	9	7	4	5
North Dakota	0	0	4	4	621	85	12	11	7	1	354	11
South Dakota	38	5	3	0	----	----	1	----	53	7	163	5
Nebraska	8	2	4	4	----	----	----	----	31	8	8	8
Kansas	17	6	8	8	75	27	11	3	204	73	2	6

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended December 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median
SO. ATL.												
Delaware	39	2	0	0					0	0	4	4
Maryland [3]	37	12	6	15	43	14	9	10	15	5	85	81
Dist. of Columbia	8	1	11	10			3		40	5	0	8
Virginia	86	46	47	44	277	148	164		56	30	18	32
West Virginia	48	18	15	25	5	2	15	52	24	9	25	25
North Carolina [3]	101	69	63	53	73	50	6	9	475	325	270	270
South Carolina [3]	60	22	4	7	6,427	2,353	448	410	19	7	11	11
Georgia [3]	23	14	7	20	543	327	77		37	22	10	0
Florida [3]	21	7	6	9	33	11	5	4	6	2	18	8
E. SO. CEN.												
Kentucky	30	17	14	29	10	6	42	29	12	7	10	14
Tennessee [3]	21	12	23	23	81	46	47	72	99	56	36	36
Alabama [3]	48	27	24	24	1,000	568	93	93	14	8	42	12
Mississippi [2,3]	38	15	10	15								
W. SO. CEN.												
Arkansas	40	16	15	15	231	93	140	47	2	1	25	10
Louisiana [3]	34	14	32	27	22	9	10	14	2	1	26	13
Oklahoma	18	9	16	16	183	91	99	98	20	10	43	4
Texas [3]	41	50	59	78	283	341	385	385	39	47	26	26
MOUNTAIN												
Montana	9	1	0	1	5,130	548	7	14	75	8	238	15
Idaho	0	0	0	0	224	22		2	602	59	80	23
Wyoming	0	0	11	0	11,214	514			175	8	18	4
Colorado	34	7	12	8	496	103	23		29	6	7	11
New Mexico	62	5	13	6					12	1	21	49
Arizona	135	11	7	3	1,080	88	189	56	49	4	5	5
Utah [3]	20	2	0	0	6,059	610	33		1,053	106	18	12
PACIFIC												
Washington	0	0	6	3			1	1	2,754	893	160	38
Oregon	0	0	3	1	875	176	23	31	263	53	17	17
California [3]	27	33	49	49	28	34	34	34	98	120	929	171
Total	24	593	735	749	305	6,465	2,047	1,965	146	3,622	4,816	4,816
50 weeks	18	23,157	28,769	28,769	166	176,258	62,720	115,544	299	370,015	789,887	713,044

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median
NEW ENG.												
Maine	6	1	0	1	0	0	0	1	145	24	11	29
New Hampshire	0	0	0	0	0	0	0	0	30	3	3	8
Vermont	0	0	0	0	0	0	0	0	0	0	4	16
Massachusetts	1.2	1	1	2	1.2	1	0	0	103	88	116	170
Rhode Island	0	0	0	0	0	0	1	0	84	11	10	18
Connecticut	0	0	1	0	0	0	1	0	187	63	69	59
MID. ATL.												
New York	0.8	2	4	5	4	9	0	0	152	379	398	429
New Jersey	1.2	1	0	1	1.2	1	1	1	211	177	87	94
Pennsylvania	6	12	1	3	2.5	5	2	2	176	346	286	428

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended December 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median
E. NO. CEN.												
Ohio	1.5	2	1	4	0.8	1	1	1	175	228	332	332
Indiana	0	0	2	2	0	0	0	0	205	138	163	167
Illinois	0	0	0	2	0.7	1	1	1	227	346	349	512
Michigan [2]	0	0	2	1	2.1	2	0	1	313	296	492	363
Wisconsin	0	0	0	1	1.8	1	0	0	281	160	174	247
W. NO. CEN.												
Minnesota	0	0	0	0	16	8	1	1	250	129	140	140
Iowa	0	0	2	2	24	12	1	1	186	92	104	104
Missouri	0	0	0	1	1.3	1	0	1	62	48	116	140
North Dakota	0	0	0	0	7	1	0	0	336	46	29	59
South Dakota	0	0	0	0	8	1	0	0	278	37	31	81
Nebraska	0	0	0	0	0	0	2	0	115	30	31	31
Kansas	2.8	1	1	1	0	0	0	1	288	103	144	160
SO. ATL.												
Delaware	20	1	0	0	20	1	0	0	315	16	11	12
Maryland [3]	0	0	0	0	0	0	0	1	167	54	51	71
Dist. of Columbia	0	0	0	0	0	0	0	0	97	12	8	16
Virginia	1.9	1	0	2	0	0	0	0	84	45	44	58
West Virginia	5	2	4	3	2.7	1	0	0	191	71	66	71
North Carolina [3]	0	0	0	1	0	0	1	0	131	90	65	65
South Carolina [3]	14	5	1	1	0	0	3	0	93	34	12	8
Georgia [3]	0	0	0	1	0	0	1	1	58	35	19	33
Florida [3]	0	0	0	0	0	0	0	0	18	6	0	5
E. SO. CEN.												
Kentucky	3	2	3	3	1.7	1	0	1	132	76	81	71
Tennessee [3]	0	0	5	3	0	0	0	1	153	87	60	60
Alabama [3]	1.8	1	0	2	1.8	1	1	1	106	60	11	20
Mississippi [2] [3]	2.5	1	0	1	0	0	1	1	58	23	21	17
W. SO. CEN.												
Arkansas	22	9	1	1	0	0	1	1	50	20	39	19
Louisiana [3]	0	0	1	1	0	0	0	0	60	25	25	21
Oklahoma	2	1	0	2	2	1	2	1	34	17	40	27
Texas [3]	0.8	1	1	1	0.8	1	1	1	27	32	114	114
MOUNTAIN												
Montana	0	0	0	0	0	0	0	0	365	39	31	37
Idaho	0	0	0	0	61	6	0	0	133	13	13	13
Wyoming	0	0	0	0	0	0	0	0	196	9	7	12
Colorado	10	2	1	1	19	4	0	0	135	28	28	66
New Mexico	0	0	0	0	12	1	0	0	383	31	28	20
Arizona	0	0	3	0	37	3	0	0	61	5	8	10
Utah [2]	0	0	0	0	89	9	0	0	258	26	35	37
PACIFIC												
Washington	0	0	1	1	0	0	0	0	126	41	58	57
Oregon	5	1	0	0	5	1	0	1	109	22	47	59
California [3]	2.5	3	4	8	6	7	1	7	138	168	223	252
Total	2.0	50	40	80	3	31	23	50	152	3,829	4,234	4,806
50 weeks	1.5	1,901	2,740	5,226	6	7,215	1,680	7,197	123	155,043	179,436	214,311

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended December 16, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934–38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases
NEW ENG.											
Maine	0	0	0	0	24	4	1	1	519	86	46
New Hampshire	0	0	0	0	0	0	0	1	41	4	0
Vermont	0	0	0	0	13	1	0	1	550	41	81
Massachusetts	0	0	0	0	1	1	1	2	206	175	226
Rhode Island	0	0	0	0	0	0	0	0	260	34	45
Connecticut	0	0	0	0	3	1	1	1	267	90	86
MID. ATL.											
New York	0	0	0	0	2	6	9	9	172	430	632
New Jersey	0	0	0	0	5	4	1	2	163	137	460
Pennsylvania	0	0	0	0	3	6	8	20	150	295	460
E. NO. CEN.											
Ohio	1	1	1	1	2	3	13	4	101	132	216
Indiana	6	4	25	3	3	3	3	3	37	25	12
Illinois	1	2	6	6	3	4	8	6	60	91	494
Michigan [2]	1	1	3	0	0	0	7	7	170	161	27[illegible]
Wisconsin	5	8	10	10	0	0	1	0	327	186	376
W. NO. CEN.											
Minnesota	12	6	38	8	0	0	3	0	130	67	12
Iowa	12	6	22	11	0	0	14	1	34	17	10
Missouri	1	1	7	2	10	8	3	8	33	26	9
North Dakota	7	1	5	5	0	0	2	0	66	9	4
South Dakota	98	13	2	6	0	0	1	1	0	0	0
Nebraska	4	1	4	4	4	1	0	0	11	3	2
Kansas	0	0	1	2	0	0	0	2	31	11	24
SO. ATL.											
Delaware	0	0	0	0	0	0	0	0	118	6	0
Maryland [2]	0	0	0	0	6	2	6	6	219	71	33
District of Columbia	0	0	0	0	8	1	1	1	154	19	23
Virginia	0	0	0	0	9	5	0	5	28	15	62
West Virginia	0	0	0	0	5	2	1	4	32	12	24
North Carolina [3]	1	1	0	0	3	2	2	4	89	61	269
South Carolina [3]	0	0	0	0	3	1	1	1	44	16	32
Georgia [3]	0	0	0	0	10	6	11	9	15	9	14
Florida [3]	0	0	0	0	6	2	1	3	12	4	0
E. SO. CEN.											
Kentucky	0	0	1	0	0	0	8	9	122	70	20
Tennessee [3]	0	0	1	1	0	0	1	6	34	19	54
Alabama [3]	0	0	0	0	4	2	0	2	87	21	69
Mississippi [2] [3]	0	0	0	0	8	3	7	2	-------	-------	-------
W. SO. CEN.											
Arkansas	2	1	2	1	15	6	4	5	27	11	10
Louisiana [3]	0	0	1	0	17	7	18	12	0	0	9
Oklahoma	10	5	8	1	14	7	2	7	0	0	4
Texas [3]	1	1	5	1	11	13	26	24	45	54	90
MOUNTAIN											
Montana	19	2	6	15	9	1	2	2	56	6	15
Idaho	0	0	5	2	10	1	0	0	0	0	0
Wyoming	0	0	1	2	0	0	0	0	175	8	2
Colorado	72	15	5	4	0	0	3	1	58	12	44
New Mexico	0	0	1	0	74	6	1	5	346	28	15
Arizona	0	0	1	0	0	0	0	0	12	1	5
Utah [2]	0	0	0	0	20	2	0	0	646	65	11

See footnotes at end of table.

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Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934-38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases	1934-38, median	Dec. 16, 1939, rate	Dec. 16, 1939, cases	Dec. 17, 1938, cases
PACIFIC											
Washington	0	0	2	12	3	1	0	1	65	21	15
Oregon	0	0	7	7	5	1	1	2	164	33	11
California ³	2	2	4	4	11	13	1	8	112	137	104
Total	8	66	174	174	5	125	163	216	110	2,719	4,402
50 weeks	7	9,346	14,059	7,134	10	12,541	14,021	14,827	136	168,386	203,918

¹ New York City only.
² Period ended earlier than Saturday.
³ Typhus fever, week ended Dec. 16, 1939, 52 cases as follows: North Carolina, 5; South Carolina, 2; Georgia, 22; Florida, 2; Tennessee, 4; Alabama, 9; Mississippi, 3; Louisiana, 2; Texas, 1; California, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Diphtheria	Influenza	Malaria	Measles	Meningitis, meningococcus	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
November 1939										
Alabama	161	497	609	20	6	15	6	192	1	14
Arkansas	110	226	251	19	3	62	8	86	4	43
California	170	99	18	779	5	7	110	849	8	93
Idaho	2	1		46	4		16	46	2	8
Kentucky	90	31	3	15	6	2	44	377	0	30
Maryland	42	21		16		1	4	181	0	18
Michigan	45	9	7	676	3		20	1,088	32	15
Minnesota	14	11		278	1		33	489	50	3
New Jersey	88	46	1	42	6		15	446	0	10
Pennsylvania	172		4	151	11	1	58	1,246	0	56
South Dakota	13	8		19	2		7	133	7	
Vermont	0			192	0		1	6	0	2

Summary of monthly reports from States—Continued

November 1939	Cases
Actinomycosis:	
California	1
Michigan	1
Anthrax:	
California	1
New Jersey	1
Pennsylvania	4
Botulism:	
California	4
Chickenpox:	
Alabama	97
Arkansas	84
California	1,575
Idaho	92
Kentucky	408
Maryland	832
Michigan	1,786
Minnesota	819
New Jersey	1,081
Pennsylvania	2,959
South Dakota	101
Vermont	240
Dengue:	
Alabama	1
Arkansas	2
Diarrhea:	
Maryland	14
Dysentery:	
Alabama (amoebic)	1
Arkansas (amoebic)	2
Arkansas (bacillary)	9
California (amoebic)	26
California (bacillary)	335
Kentucky (amoebic)	1
Kentucky (bacillary)	5
Maryland (bacillary)	11
Maryland (unspecified)	1
Michigan (bacillary)	12
Minnesota (amoebic)	2
New Jersey (amoebic)	1
Pennsylvania (amoebic)	1
Pennsylvania (baccillary)	7
Encephalitis, epidemic or lethargic:	
Alabama	1
California	7
Kentucky	1
Maryland	1
New Jersey	2
Pennsylvania	1
Food poisoning:	
California	53
German measles:	
Alabama	2
Arkansas	1

November 1939—Continued	Cases
German measles—Con.	
California	74
Idaho	4
Maryland	8
Michigan	82
New Jersey	86
Pennsylvania	36
Vermont	8
Granuloma, coccidioidal:	
California	5
Hookworm disease:	
Arkansas	3
California	1
Impetigo contagiosa:	
Maryland	25
Jaundice, epidemic:	
California	89
Leprosy:	
California	1
Mumps:	
Alabama	13
Arkansas	65
California	967
Idaho	33
Kentucky	31
Maryland	20
New Jersey	593
Pennsylvania	586
South Dakota	88
Vermont	44
Ophthalmia neonatorum:	
New Jersey	14
Pennsylvania	2
Puerperal septicemia:	
Arkansas	2
Rabies in animals:	
Alabama	8
Arkansas	25
California	16
Michigan	3
Minnesota	2
New Jersey	29
Rabies in man:	
Michigan	2
Relapsing fever:	
California	2
Septic sore throat:	
Arkansas	85
California	9
Idaho	1
Kentucky	61
Maryland	18
Michigan	43
Minnesota	289
New Jersey	10
South Dakota	2

November 1939—Continued	Cases
Tetanus:	
Alabama	8
Arkansas	1
California	5
Maryland	1
Michigan	2
Trachoma:	
Arkansas	17
California	30
Maryland	1
New Jersey	1
Trichinosis:	
Arkansas	1
California	3
Michigan	1
Tularaemia:	
Arkansas	2
Kentucky	21
Maryland	2
Michigan	2
Minnesota	5
Pennsylvania	3
South Dakota	1
Typhus fever:	
Alabama	44
California	11
Maryland	1
New Jersey	1
Pennsylvania	1
Undulant fever:	
Alabama	3
Arkansas	1
California	27
Kentucky	2
Maryland	7
Michigan	13
Minnesota	12
New Jersey	2
Pennsylvania	20
South Dakota	1
Vermont	1
Vincent's infection:	
Maryland	11
Michigan	20
Vermont	3
Whooping cough:	
Alabama	90
Arkansas	46
California	551
Idaho	3
Kentucky	331
Maryland	230
Michigan	528
Minnesota	240
New Jersey	550
Pennsylvania	1,482
South Dakota	20
Vermont	295

MENINGO-ENCEPHALITIS IN ANACONDA, MONTANA

Thirty-nine cases of meningo-encephalitis have been reported as occurring in and around Anaconda, Mont., (population 13,000) with onsets between October 13 and December 4, 1939. Two deaths were reported, but in general the affection was mild and transient, similar to the Windber meningo-encephalitis noted in the Public Health Reports of August 16, 1935 (vol. 50, p. 1120). Neither outbreak resembled the St. Louis outbreak of encephalitis in age distribution, cerebral symptoms, or severity. Serum from 18 patients in Windber,

Pa., taken 32 to 116 days after onset and nearly as long after recovery from the outbreak, did not neutralize the virus of lymphocytic choriomeningitis. As at Windber, there has been no apparent association of the cases with water or with insects.

CASES OF VENEREAL DISEASES REPORTED FOR OCTOBER 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,214	4.15	320	1.09
Arizona	188	4.50	104	2.49
Arkansas	623	3.00	234	1.13
California	1,613	2.58	1,344	2.15
Colorado	93	.86	80	.74
Connecticut	178	1.02	100	.57
Delaware	185	7.03	51	1.94
District of Columbia	440	6.92	327	5.14
Florida	1,973	11.61	125	.74
Georgia	2,031	6.52	30	.10
Idaho	66	1.32	21	.42
Illinois	2,356	2.98	1,497	1.89
Indiana	536	1.53	97	.28
Iowa	318	1.24	210	.82
Kansas	253	1.36	105	.56
Kentucky	689	2.33	319	1.08
Louisiana	493	2.30	64	.30
Maine	29	.34	52	.60
Maryland	1,026	6.09	325	1.93
Massachusetts	464	1.05	474	1.07
Michigan	910	1.86	537	1.10
Minnesota	231	.86	210	.79
Mississippi	2,195	10.76	2,511	12.31
Missouri	548	1.36	233	.58
Montana	33	.60	13	.24
Nebraska	68	.50	52	.38
Nevada	23	2.25	17	1.67
New Hampshire	18	.35	10	.20
New Jersey	1,024	2.35	329	.75
New Mexico	139	3.29	51	1.21
New York	3,733	2.87	1,677	1.29
North Carolina	2,325	6.59	429	1.22
North Dakota	28	.39	42	.59
Ohio	1,023	1.51	465	.69
Oklahoma	906	3.53	311	1.21
Oregon	176	1.70	140	1.35
Pennsylvania	1,424	1.39	117	.11
Rhode Island	122	1.79	56	.82
South Carolina	1,203	6.36	276	1.46
South Dakota	55	.80	40	.58
Tennessee	938	3.21	393	1.34
Texas	3,742	6.00	770	1.24
Utah	104	1.99	68	1.30
Vermont	11	.28	16	.41
Virginia	1,779	6.49	449	1.64
Washington	244	1.46	340	2.03
West Virginia	209	1.10	106	.56
Wisconsin	62	.21	139	.47
Wyoming	32	1.35	19	.80
Hawaii	100	2.47	90	2.22
Total	38,173	2.92	15,785	1.21

NOTE.—Rates based on 1938 estimated population.

Reports from cities of 200,000 population or over [1]

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Akron, Ohio	45	1.64	35	1.27
Atlanta, Ga	369	12.29	74	2.46
Baltimore, Md	641	7.67	202	2.42
Birmingham, Ala	335	11.38	47	1.60
Boston, Mass	180	2.26	169	2.12
Buffalo, N. Y	113	1.88	39	.65
Chicago, Ill	1,431	3.90	961	2.62
Cincinnati, Ohio	170	3.60	135	2.86
Cleveland, Ohio	247	2.61	117	1.24
Columbus, Ohio	94	3.00	29	.93
Denver, Colo	56	1.86	70	2.32
Detroit, Mich	445	2.45	297	1.64
Houston, Tex	380	10.60	119	3.32
Indianapolis, Ind	17	.44	35	.91
Jersey City, N. J	21	.65	10	.31
Kansas City, Mo	106	2.45	50	1.16
Louisville, Ky	203	5.99	98	2.89
Memphis, Tenn	268	9.18	79	2.71
Minneapolis, Minn	61	1.22	43	.86
Newark, N. J	300	6.60	77	1.70
New Orleans, La	84	1.72	54	1.10
New York, N. Y	2,482	3.31	1,138	1.52
Omaha, Nebr	18	.80	25	1.12
Pittsburg, Pa	332	4.71	27	.38
Portland, Oreg	126	3.93	82	2.56
Providence, R. I	64	2.47	32	1.23
Rochester, N. Y	43	1.26	20	.58
St. Louis, Mo	232	2.75	166	1.97
St. Paul, Minn	21	73	31	1.08
San Francisco, Calif	167	2.42	218	3.16
Seattle, Wash	85	2.20	157	4.06
Syracuse, N. Y	105	4.66	14	.62
Washington, D. C	440	6.92	327	5.14

[1] No reports were received from Dallas, Dayton, Los Angeles, Milwaukee, Oakland, Philadelphia, San Antonio, or Toledo.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 9, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	218	206	50	967	651	1,323	15	346	27	1,102	--------
Current week [1]	139	184	43	662	431	922	5	324	24	862	--------
Maine:											
Portland	1	------	0	5	4	1	0	1	0	12	20
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	10
Manchester	0	------	0	0	1	0	0	0	0	0	9
Nashua	0	------	0	1	0	0	0	0	0	0	7
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	6	10
Rutland	0	------	0	0	0	0	0	0	0	--------	2
Massachusetts:											
Boston	1	------	0	33	15	29	0	6	1	21	203
Fall River	0	------	0	0	0	0	0	1	0	15	24
Springfield	0	------	0	1	1	0	0	0	0	9	31
Worcester	0	------	0	2	7	1	0	1	0	7	41

[1] Figures for Barre and Atlanta estimated; reports not received.

City reports for week ended December 9, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Rhode Island:											
Pawtucket	0		0	0	0	1	0	0	0	2	19
Providence	1		0	80	1	9	0	8	0	14	73
Connecticut:											
Bridgeport	0		0	1	0	2	0	8	0	0	39
Hartford	0		0	2	5	2	0	0	0	23	44
New Haven	0	1	0	0	2	1	0	1	1	8	44
New York:											
Buffalo	0		0	4	8	5	0	5	0	8	106
New York	35	12	4	19	75	100	0	77	4	119	1,459
Rochester	0		0	1	6	11	0	0	0	9	90
Syracuse	0		0	0	2	6	0	0	0	21	37
New Jersey:											
Camden	2		0	0	0	11	0	1	0	0	23
Newark	0	3	0	5	6	12	0	6	0	31	115
Trenton	0		0	1	1	3	0	2	0	2	80
Pennsylvania:											
Philadelphia	2	2	3	10	20	54	0	20	1	63	460
Pittsburgh	3		0	2	14	22	0	2	0	7	156
Reading	0		0	2	1	0	0	2	0	1	23
Scranton	0			0		4	0		0	0	
Ohio:											
Cincinnati	6		0	4	3	19	0	2	0	10	144
Cleveland	8	22	1	0	12	80	0	11	0	38	215
Columbus	15	4	4	0	7	11	0	4	0	0	88
Toledo	0		0	17	6	11	0	4	0	4	55
Indiana:											
Anderson	0		0	0	0	3	0	0	0	16	9
Fort Wayne	2		0	0	2	6	0	1	0	2	26
Indianapolis	1		3	5	5	15	0	4	0	21	104
Muncie	0		0	0	2	4	0	0	0	0	11
South Bend	0		0	0	0	0	0	0	0	3	13
Terre Haute	0		1	0	1	0	0	0	0	0	22
Illinois:											
Alton	0		1	0	0	1	0	0	0	1	6
Chicago	6	8	4	7	31	159	0	26	1	46	707
Elgin	0		0	0	4	1	0	0	0	3	16
Moline	0		0	0	0	2	0	0	0	0	8
Springfield	0		0	2	8	1	0	0	1	4	21
Michigan:											
Detroit	8	7	0	9	18	66	0	15	1	32	263
Flint	0		0	1	5	5	0	0	0	13	31
Grand Rapids	0		0	6	0	27	0	1	0	6	44
Wisconsin:											
Kenosha	0		0	0	0	1	0	0	0	2	9
Madison	0		0	1	0	0	0	0	0	17	16
Milwaukee	0	1	1	0	8	25	4	1	0	19	99
Racine	0		0	1	1	0	0	0	0	5	12
Superior	0		0	2	0	2	0	0	0	0	5
Minnesota:											
Duluth	0		0	16	0	0	0	0	0	0	21
Minneapolis	0		0	0	3	32	0	1	0	4	107
St. Paul	0		0	0	4	18	0	1	0	36	60
Iowa:											
Cedar Rapids	0			5		0	1		0	5	
Davenport	0			1		5	0		0	1	
Des Moines	0		0	5	0	14	0	0	0	0	27
Sioux City	0			0		5	0		0	0	
Waterloo	2			0		2	0		0	0	
Missouri:											
Kansas City	0		0	2	2	24	0	5	0	2	75
St. Joseph	1		0	0	2	2	0	1	0	0	26
St. Louis	2		1	4	11	15	0	7	3	12	220
North Dakota:											
Fargo	0		0	0	0	2	0	0	0	1	7
Minot	0		0	0	0	2	0	0	0	1	5
South Dakota:											
Aberdeen	2			0		2	0		0	0	
Sioux Falls	0		0	0	0	3	0	0	0	0	7
Nebraska:											
Omaha	1		0	0	4	3	0	1	0	2	53
Kansas:											
Lawrence	0		0	0	2	0	0	0	0	0	8
Topeka	0		0	0	1	6	0	0	1	1	8
Wichita	1		0	35	2	7	0	0	1	2	31

City reports for week ended December 9, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Delaware:											
Wilmington	1	------	0	0	0	4	0	1	1	6	33
Maryland:											
Baltimore	3	7	3	2	15	14	0	9	0	52	211
Cumberland	0	------	0	0	1	1	0	0	0	0	9
Frederick	0	------	0	0	0	1	0	0	0	0	3
Dist. of Col.:											
Washington	2	2	2	1	6	2	0	8	1	10	172
Virginia:											
Lynchburg	0	------	0	0	1	4	0	1	0	5	12
Norfolk	4	9	0	9	4	2	0	1	0	3	28
Richmond	0	------	1	1	4	6	0	3	0	2	54
Roanoke	0	------	0	0	0	2	0	0	0	0	14
West Virginia:											
Charleston	0	------	0	0	0	1	0	0	0	0	17
Huntington	1	------	------	1	------	1	0	------	0	0	------
Wheeling	1	------	0	1	1	2	0	1	0	0	26
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	1	4	1	0	2	0	0	16
Wilmington	5	------	0	0	2	0	0	1	0	0	16
Winston-Salem	5	1	2	0	2	4	0	1	0	0	22
South Carolina:											
Charleston	1	42	1	0	2	0	0	1	1	0	21
Florence	0	------	1	0	3	0	0	0	0	0	19
Greenville	0	------	0	0	0	0	0	0	0	0	3
Georgia:											
Atlanta	------	------	------	------	------	------	------	------	------	------	------
Brunswick	0	------	0	0	0	0	0	0	0	0	4
Savannah	1	22	0	1	2	1	0	1	0	0	32
Florida:											
Miami	0	4	2	0	2	0	0	0	1	0	37
Tampa	2	2	2	0	2	0	0	1	1	0	29
Kentucky:											
Ashland	0	------	0	0	2	0	0	0	0	0	5
Covington	0	------	0	0	1	6	0	4	0	0	17
Lexington	1	------	0	0	0	1	0	1	0	0	20
Tennessee											
Knoxville	0	------	1	0	2	19	0	3	0	0	34
Memphis	0	------	1	1	9	8	0	3	1	22	82
Nashville	0	------	0	4	4	4	0	3	0	10	61
Alabama											
Birmingham	1	31	2	0	9	8	0	7	0	0	88
Mobile	1	2	0	0	1	4	0	3	0	0	12
Montgomery	0	------	------	0	------	3	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	1	0	------	0	0	------
Little Rock	1	------	0	0	1	0	0	2	0	0	------
Louisiana:											
Lake Charles	1	------	0	0	0	0	0	0	0	1	5
New Orleans	1	4	4	0	10	6	0	12	2	25	151
Shreveport	0	------	0	0	5	0	0	3	0	0	50
Oklahoma:											
Oklahoma City	0	2	1	0	8	3	0	3	1	0	48
Tulsa	0	------	------	2	------	1	0	------	0	1	------
Texas:											
Dallas	4	1	1	0	1	4	0	4	0	1	56
Fort Worth	0	------	0	0	4	5	0	3	0	4	34
Galveston	0	------	0	0	3	0	0	1	0	0	15
Houston	1	------	0	0	5	6	0	8	2	0	91
San Antonio	1	------	0	17	3	1	0	2	0	0	69
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	10
Great Falls	0	------	0	0	0	2	0	0	0	2	7
Helena	0	------	0	0	0	0	0	0	0	0	5
Missoula	0	------	0	0	0	3	0	0	0	1	3
Idaho:											
Boise	0	------	0	0	2	0	0	0	0	0	5
Colorado:											
Colorado Springs	0	------	0	0	0	3	0	1	0	0	12
Denver	8	------	0	2	7	8	0	2	0	6	84
Pueblo	0	------	0	0	1	3	0	0	0	0	5
New Mexico:											
Albuquerque	1	------	0	0	1	1	0	4	1	1	16
Utah:											
Salt Lake City	0	------	0	20	2	8	1	0	0	64	35

City reports for week ended December 9, 1939—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Washington:											
Seattle	0	------	0	15	6	4	0	1	0	1	96
Spokane	0	------	0	8	3	10	0	0	0	1	48
Tacoma	0	------	0	309	1	0	0	1	0	0	32
Oregon:											
Portland	0	------	0	2	4	9	0	8	0	5	76
Salem	0	------	--------	1	-------	2	0	-------	0	0	--------
California:											
Los Angeles	7	7	1	17	11	29	0	15	0	10	339
Sacramento	0	------	0	1	4	4	0	1	0	0	26
San Francisco	0	2	0	5	7	13	0	7	0	18	182

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases	State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Massachusetts:				Iowa:			
Boston	0	0	1	Des Moines	0	0	1
Worcester	0	0	1	Kansas:			
Rhode Island:				Wichita	1	1	1
Providence	1	0	0	Maryland:			
New York:				Baltimore	2	0	1
New York	0	2	1	Texas:			
Pennsylvania:				San Antonio	1	0	0
Philadelphia	1	0	1	Colorado:			
Indiana:				Denver	0	0	1
Indianapolis	0	0	1	Oregon:			
Illinois:				Portland	0	0	1
Chicago	0	0	1	California:			
Springfield	1	0	0	Los Angeles	0	0	2
Michigan:				San Francisco	0	0	1
Detroit	0	0	2				

Dengue fever.—Cases: Charleston, S. C., 1.
Encephalitis, epidemic or lethargic.—Cases: New York, 2; Newark, 1; Wichita, 1; Denver, 1.
Pellagra.—Cases: Winston-Salem, 1; Savannah, 1; San Antonio, 1.
Typhus fever.—Cases: New York, 1; Baltimore, 1; Charleston, S. C., 1; Savannah, 6; Mobile, 2; Montgomery, 1; New Orleans, 3; Fort Worth, 1; Houston, 1.—Deaths: Baltimore, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 25, 1939.—During the week ended November 25, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			2	1						3
Chickenpox		34	3	249	380	49	22	20	133	890
Diphtheria		1	3	45	8	10	16	1		84
Dysentery									2	2
Influenza		26			8	1			13	48
Lethargic encephalitis					6					6
Measles				96	270	39	1		35	441
Mumps				35	94	7	2		16	154
Pneumonia		11			16	1	1		2	31
Poliomyelitis					3		1			4
Scarlet fever	4	21	33	169	170	22	2	21	12	454
Trachoma						1				1
Tuberculosis			20	72	39	3		1		135
Typhoid and paratyphoid fever				8	7	4	1			20
Whooping cough		60	22	135	62	52	22	32	10	395

CUBA

Habana—Communicable diseases—4 weeks ended November 18, 1939.—During the 4 weeks ended November 18, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9		Scarlet fever	1	
Malaria	22	1	Tuberculosis	1	1
Poliomyelitis	3		Typhoid fever	17	5

JAMAICA

Communicable diseases—4 weeks ended November 25, 1939.—During the 4 weeks ended November 25, 1939, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox		5	Tuberculosis	31	76
Diphtheria	2	2	Typhoid fever	6	61
Puerperal fever	1	3			

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LATVIA

Notifiable diseases—July–September 1939.—During the months of July, August, and September 1939, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	July	August	September	Disease	July	August	September
Botulism	5		1	Mumps	133	42	27
Cerebrospinal meningitis	8	10	3	Paratyphoid fever	10	24	67
Diphtheria	87	87	107	Poliomyelitis	2	8	4
Dysentery		1	1	Puerperal septicemia	3	5	2
Erysipelas	32	35	29	Scarlet fever	175	215	285
Influenza	31	28	36	Tetanus	1	4	5
Lead poisoning	2	4	3	Trachoma	30	26	38
Leprosy	1		2	Tuberculosis	306	250	206
Lethargic encephalitis	1			Typhoid fever	56	80	145
Malaria		1		Undulant fever		1	
Measles	415	98	21	Whooping cough	65	33	23

SWITZERLAND

Notifiable diseases—September 1939.—During the month of September 1939, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Paratyphoid fever	12
Chickenpox	53	Poliomyelitis	177
Diphtheria	59	Scarlet fever	334
German measles	4	Tuberculosis	219
Influenza	6	Typhoid fever	8
Malaria	3	Undulant fever	7
Measles	66	Whooping cough	190
Mumps	18		

YUGOSLAVIA

Communicable diseases—4 weeks ended November 5, 1939.—During the 4 weeks ended November 5, 1939, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	39	4	Poliomyelitis	9	1
Cerebrospinal meningitis	21	6	Scarlet fever	510	6
Diphtheria and croup	1,175	109	Sepsis	3	
Dysentery	106	5	Tetanus	46	17
Erysipelas	241	1	Typhoid fever	432	38
Favus	9		Typhus fever	8	
Paratyphoid fever	21	1	Weil's disease	1	

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From the medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following table must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939					October 1939				November 1939			
						2	9	16	23	30	7	14	21	28	4	11	18	25
Afghanistan	C				336			19			17							
	D			82	144		[1] 58							[1] 244				
Kandahar Province	C				101	[1] 107												
Greshk	C			5														
Tchakhansour	C			P														
Ceylon: Batticaloa	C			1						2	2	2						
China:																		
Canton	C	9																
	D	6																
Fatshan	C	P																
	D	154																
Hainan Island	C	P																
Hankow	C			P														
Honan	C	P																
Hong Kong	C	25	113	214	189	17	5	12	18	27	21	11	11	4	10	1	1	
	D	19	80	136	125		7		8		15				4	2		
Macao	C	20	59	403	54	11		17	21	26	25	17	31	16	14	3		
	D	12	33	188	22	9									7	2		
Shanghai	C		1	2	3	36	64	93	71	60	22	22	29	19	4	1	1	
Tientsin	C				1											[3] 33		
Tsinan	C									3								
Tsingtao	C									P		[2] 122						
Whampoa	C	P																
India	C	7,117	6,638	18,349	19,482	4,789	4,251	3,799	3,777	3,497	2,878							
	D	3,337	2,877	8,283	9,618	2,464	2,281	1,905	2,008	1,965	1,507							
Akyab	C	1	1	[3] 1														
Allahabad	C	1	[3] 1	24	39	10	2	6	2	1	1	1						
Assam	C	405	321	76	18	6		5	5	15	2		50	6	12	3	34	25
	D	156	117	32	8	3		5	1	8	1		49	4	2	2	15	

[1] For 2 weeks.
[2] For 6 weeks.
[3] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939 2	9	16	23	30	October 1939 7	14	21	28	November 1939 4	11	18	25
India—Continued.																		
Bassein	C	6	5															
Bengal Presidency	C	3,193	2,040	3,732	2,086	454	420	377	427	462	408	186	397	595		1,226	1,097	781
	D	1,504	874	1,578	1,248	272	227	222	267	266	249	103	235	359		670	632	
Bihar Province	C	584	263															
	D	264	107															
Bombay Presidency	C	196	98	1,139	1,115	136	107	85	46	26								
	D	83	37	429	373	70	40	41	12	15								
Burma	C				43	16	3	5	15		2	6	6	16	15	10	9	15
	D				41		3	5	15		2	6	9	8	9	10	5	13
Calcutta	C	821	593	636	93	13	11	14	12	15	19	12	11	29	28	6	11	24
Cawnpore	C	4	10	5	94	18	9	11	7	5	12	3	2	1				
	D	2	4	4	28													
Central Provinces and Berar	C	194	34	79	600		180	488	382	306	351	205	208	109	151	164	52	62
Chittagong	C	9	3	13	7	1	1	1	5		2		2		1		2	
Delhi	C			1	2					1			67	67	14		2	
	D				2										1	1	2	
Howrah	C	420	257	311	123	8	6	1	4									
Madras Presidency	C	60	66	200	107	6	10	6	3	10				1				
	D	24	13	70	36	3	4	3	1	3								
Madras	C		1															
Orissa Province	C	111	173	719	736	387	527	658	891	976	868	653	530	720	732	602	546	
Punjab	C				6	2												
Rangoon	C	9	4															
Sind State	C						6	6										
India (French): Pondichery Territory	C				1													
India (Portuguese)	C								3	9	3	1	1					
Indochina (French): Tonkin Province	C			1														
Iran:																		
Khorassan	C			371	30													
Zabol	C			34														
Iraq: Basra	C				[4] 1													
Japan: Osaka	C											[3] 1						
Thailand: Bangkok	C	1								1	1							

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Sept. 2	Sept. 9	Sept. 16	Sept. 23	Sept. 30	Oct. 7	Oct. 14	Oct. 21	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Nov. 25
On vessels:																		
S. S. *Erinpura* at Rangoon from Calcutta	C	1																
S. S. *Amra* at Calcutta from Rangoon	C		1															
S. S. *Tin How* at Singapore from Hong Kong	C			1														
S. S. *Essi* at Hong Kong from Calcutta	C			1														

[3] Imported.
[4] Suspected.

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939: 2	9	16	23	30	October 1939: 7	14	21	28	November 1939: 4	11	18	25
Argentina (see also table below)	C			2														
	D			2														
Belgian Congo	C	18		1	1	5	2	2	2			[2] 8		10		2		
British East Africa:																		
Nyasaland	C			2														
Uganda	C	17	25	61	25	7	4	9	10	15	5	8	3					
	D	17	25	55	23	3	4	8	8	13	5	8	1					
China: Manchuria.[3] (See also table below.)																		
Dutch East Indies:																		
Java—																		
Batavia	C				[4] 1													
Batavia Residency.[5]																		
Java and Madura	C	94	37	130	91	17	29	28										
	D	94	37	130	91	17	29	27										
Ecuador. (See table below.)																		
Egypt: Asyut Province	C	10	2															
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector		1		1			2			1	1		4		1	3		
Kapulena			1															
Paauhau Sector [6]				3		1		1					1	1			1	
Paauilo			1															

[1] Including plague in the United States and its possessions.
[2] For 2 weeks.
[3] A report dated Nov. 3, 1939, states that during the year to date 477 cases of plague with 332 deaths occurred in Manchuria, China.
[4] Imported.
[5] A report dated July 10, 1939, states that up to July 6, 1939, 84 deaths from pneumonic plague occurred in Batavia Residency, Java, Dutch East Indies.
[6] During the week ended December 2, 1939, 1 plague-infected rat was reported in Paauhau Sector, Hamakua District, Island of Hawaii, T. H.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939 2	9	16	23	30	October 1939 7	14	21	28	November 1939 4	11	18	25
India	C	770	72	291	1,738	548	519	1,388	877	423	762							
	D	524	35	152	1,111	340	251	924	425	226	383							
Bassein	C		1	2	1		2	2					1					
Plague-infected rats					2			2										
Bihar Province	C	12																
	D	9																
Bombay Presidency	C	11	6	24	127	32	73	190	124	143								
	D	8	2	11	65	11	26	107	61	81								
Burma	C			44	40	32	17	9	24	20	10	22	29	17	16	15	27	37
	D			36	41		21	9	17	19	11	14	30	12	14	10	25	24
Calicut	C	1								2	1							
Central Provinces and Berar	C	198	6	7	137	47	76	140	130	135	148	137	165	112	118	145	154	121
Cochin	C																1	
Coorg Province	C	1	1	2														
Madras Presidency	C	14	14	12	18	7	13	10	8	15								
	D	8	6	2	6	2	5	5	4	3								
Rangoon	C		1		1							1					1	
	D		1		1												1	
Indochina: Cambodia	C		1															
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Thailand: Bichitr Province	C	4																
	D	1																
Union of South Africa	C				6		4											
Cape Province	C	1																
United States.[7]																		
Venezuela.[8]																		

Place		May 1939	June 1939	July 1939	August 1939	September 1939	October 1939
Argentina (see also table above):							
Jujuy Province	C					1	
Mendoza Province	C			1			
Salta Province	C						1
San Luis Province	C			1			
Tucuman Province	C						1
China: Fukien Province	C			[9] 467	285		
Ecuador: Guayquil and vicinity—Plague-infected rats				41			

Place		May 1939	June 1939	July 1939	August 1939	September 1939	October 1939
Madagascar (central region)	C	16	12	21	25	34	
	D	14	12	19	22	32	
Peru	C	11	3	7	2	11	
Cajamarca Department	C					4	
Lambayeque Department	C	1					
Libertad Department	C	3	1		2	1	
Lima Department	C		1	7		1	
Piura Department	C	7	1			5	

[4] Imported.

[7] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1939: *California*—Insects, June and Sept. 30; *Idaho*—Insects, June 14; *Montana*—Ground squirrels, July 15; insects, July 15 and 17; *Oregon*—Ground squirrels, June; insects, May and June; *Washington*—Rabbit, May; insects, May; *Wyoming*—Insects, July 3.

[8] A report dated Dec. 7, 1939, states that 3 cases of plague were reported in Aragua State, Venezuela.

[9] Includes 92 cases of pneumonic plague.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939					October 1939				November 1939			
						2	9	16	23	30	7	14	21	28	4	11	18	25
Algeria: Oran Department	C	2	1	2														
Angola. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
Brazil: Porto Alegre	C	7	6															
British East Africa:																		
Nairobi	C		26															
Nyasaland	C			1	17	1	4		3		14							
Tanganyika	C	9	48	19	31		33			18								
Canada:																		
Alberta	C		22															
Manitoba	C	2	1	1														
Saskatchewan	C		1	1														
China (see also table below):																		
Dairen	C	5	2	2														
Foochow	C	12	8	13	14				5	7								
Hong Kong	C	11	1	2												1		
	D	11	1	1												1		
Shanghai	C	18	8	3	1								2	1				
Tientsin	C	1	1															
Chosen (Korea). (See table below.)																		
Colombia (see also table below): Cartagena	C			1							3	3	5				12	1
Dahomey. (See table below.)																		
Dominican Republic	C				1													
Ecuador: Guayaquil	C		3	1														
	D		1															
Eritrea: Massaua	C		1	1														
French Equatorial Africa: Brazzaville	C				31													
French Guinea	C			40														
Gold Coast	C			45		[1] 95												
Accra	C			1														
Greece. (See table below.)																		
India	C	17,603	11,499	8,220	4,249	805	844	655	621	689	520							
	D	4,051	3,009	2,156	1,056	187	198	184	161	153	112							
Allahabad	C	1		1														
Assam	C	252	127	72	105	15	18	22	29	11	7	23	58	26	17	27	38	

Bengal Presidency	C	1,626	781	676	220	93	62	49	54	49	37	3	15	13		29	33	
	D	605	295	240	77	29	13	22	14	11	15		3	7		12	9	
Bihar Province	C	2,360	672															
Bombay Presidency	C	4,061	2,809	1,924	1,127	232	198	150	92	154								
	D	598	415	423	229	44	41	32	13	23								
Bombay	C	41	40	50	28	3		2	1	1	2	2	1	1		2		
	D	17	21	32	17											2		1
Burma	C			8	18	7	3		2	14	12	4	6	4	3	2	6	13
	D			3	8		2		1	3	2	4	1	1	1	2	1	3
Calcutta	C	298	127	112	22	5	1	3	3	1	1	1	1	3	3	3	4	2
	D	235	95	77	17	3		1			2						2	
Calicut	C								1	1	1	3	1	1				
Cawnpore	C	16	3															
Central Provinces and Berar	C	904	757	367	126	23	3	37	1	10	9	5	12	34	18	15	16	44
Cochin	C		1															
Delhi	C	203	99	34	14	1		1	3			1	2	1		1		3
Howrah	C	103	87	73	14	18	11	16	5	6	3							
Jodhpur	D	38	7	14	2		1	1							1	1		4
Karachi	C	8	1	6	7	1	3		1		1	1			1			
Madras Presidency	C	545	465	705	638	121	158	115	121									
	D	155	102	128	135	15	19	21	34									
Madras	C	32	12	13	11	1	3	2		1		5	1	4	1		1	1
Negapatam	C				1		1											
Northwest Frontier Province	C	86	165	95	21	9	7	8	9	29	9	4	21	59	52	15	40	103
Orissa Province	C	722	376	391	510	98	167	118	106	138	130	81	107	109	98	125	98	173
Punjab	C	214	214	80	1	5	6	9	5		1							3
Rangoon	C	14	10	4	16	7	3		2	14	10	1	6	3	1	1	1	5
Sind State	C	209	131	173	84	14	3		27	9	18	7	13	1	1	1		1
India (French):																		
Chandernagor Territory	C	3		2		1				1								
Pondichery Territory	C			10		1		2	3	3		1						
	D			5		1		1	1	1		1						
Indochina (French) (see also table below):																		
Tonkin Province	C	135	54	3														
Hanoi	C	22	3	3														
Saigon-Cholon	C										1	1						
Iran	C	3	3															
Teheran	D			6	1				9	4	6		1					
Iraq	C		6											1				19
Baghdad	C	[2] 1																
Japan:																		
Nagoya	C			1	1													
Osaka	C	5	1															
Mexico (see also table below):																		
Mexico, D. F	C	3	5	3	1		2											
Monterrey	C				1						1		1			4	6	14
San Luis Potosi	D	1	4	1						1								
Tampico	C				1													
Morocco. (See table below.)																		
Mozambique	C	32	1	1		11	4	3										

[1] For 5 weeks.
[2] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	July 30–Aug. 26, 1939	Week ended— September 1939					October 1939				November 1939			
						2	9	16	23	30	7	14	21	28	4	11	18	25
Nigeria	C	514	76	116	83	58	25	21	23	12	14	21	23					
Calabar	C	44		1	2	1		1	1	1								
Lagos	C	4			1				1									
Port Harcourt	C		[3] 1			1												
Niger Territory. (See table below.)																		
Northern Rhodesia	C						1	6		1		1						
Portugal (see also table below):																		
Lisbon	C	33	53	32	39	12	8	14	17	8	4	6	2	3	2			
Oporto	C	8	10	12	1		1				1	1			2	1		
Portuguese East Africa	C								7									
Portuguese Guinea. (See table below.)																		
Senegal. (See table below.)																		
Sierra Leone	C	20			2		[3] 4		[3] 1									
Society Islands: Tahiti	C			12														
Southern Rhodesia	C	11	3			6			3									
Spain (see also table below):																		
Barcelona	C			5														
Malaga	D			5	1			3	1	2	2	1	2					
Seville	D											[3] 1						
Valencia	C		1		12	1		7		2	5	2	1	3	6	1		
Sudan (Anglo-Egyptian)	C	12	15	23	106	9	5			4					35	1		53
Thailand	C		1	3	2		1											
Bangkok	C			1														
Nan Province	C			24							70							
Turkey. (See table below.)																		
Union of South Africa. (See table below.)																		
Venezuela. (See table below.)																		

On vessels:
- S. S. *Liebenfels* at Rangoon from Moulmein ... 1 case ... June 2, 1939
- S. S. *City of Pittsburgh*, Manila, P. I. ... 1 case ... June 28, 1939
- S. S. *Atalaya* at New Orleans ... 1 case ... July 25, 1939

On vessels—Continued.
- S. S. *Saturnia* at Jamaica, N. Y., from Lisbon ... 1 case ... Aug. 3, 1939
- S. S. *Erinpura* at Rangoon from Madras ... 1 case ... Aug. 7, 1939

Place		May 1939	June 1939	July 1939	August 1939	September 1939	October 1939
Angola	C			[4] 36	22		
Belgian Congo	C	169	199				
Bolivia:							
Cochabamba Department	C		9	6			
La Paz Department	C	4	1				
Oruro Department	C		4	14			
Potosi Department	C						
Santa Cruz Department	C	2		1			
China: Harbin	C	1	1				
Chosen (Korea)	C			7	1	7	
Colombia (see also table above)	C	437	375	137	161		
Dahomey	C			8			15
Ecuador: Guayaquil and vicinity	C		5				
Greece	C	11					
Indochina (French) (see also table above)	C	671	178	103	149	93	
	D	109	31	21	30	19	
Mexico (see also table above):							
Aguascalientes State	D		[5] 3		[6] 5		
Chiapas State	D				[6] 1		
Chihuahua State	D		[5] 5		[6] 1		
Coahuila State	D		[5] 2	7			
Durango State	D				[6] 4		
Guanajuato State	D		[5] 246		[6] 270		
Guerrero State	D		[5] 3		[6] 3		
Hidalgo State	D		[5] 13		[6] 9		
Jalisco State	D		[5] 4		[6] 3		
Mexico, D. F.	D		5		1		

Place		May 1939	June 1939	July 1939	August 1939	September 1939	October 1939
Mexico (see also table above)—Con.							
Mexico State	D		[5] 146		[6] 41		
Michoacan State	D		[5] 137		[6] 79		
Morelos State	D		[5] 9		[6] 1		
Nayarit State	D		[5] 2				
Nuevo Leon State	D		[5] 1		[6] 2		
Oaxaca State	D		[5] 1		[6] 1		
Puebla State	D		[5] 20		[6] 32		
Queretaro State	D		[5] 34		[6] 31		
San Luis Potosi State	D		[5] 22		[6] 19		
San Luis Potosi	C		8	9		6	
	D		5	1		1	
Sinaloa State	D		[5] 7		[6] 1		
Tlaxcala State	D				[6] 2		
Vera Cruz State	D				[6] 1		
Zacatecas State	D		[5] 27		[6] 16		
Morocco	C	6					1
Niger Territory	C		3				
Portugal (see also table above)	C			79	180	102	
	D			3	7	14	
Portuguese Guinea	C		7				
Senegal	C	55	25	24	2	3	4
Spain (see also table above)	C	49		31	59		
Turkey	C	34				1	
Union of South Africa: Transvaal	C		81	56	7		
Venezuela	D	7	6	2		19	
Caracas	C			1	22	11	7

[2] Imported.
[3] For 2 weeks.
[4] For June and July.
[5] For May and June.
[6] For July and August.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended— August 1939				September 1939					October 1939				November 1939			
					5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25
Algeria:																					
Algiers Department	C	26	74	45	7	4	12	7	6	35	1	20			8			1	3		
Algiers	C	22	14	6											2	1			2		
Constantine Department	C	188	198	111	11	10	2	3	3	3		1	21	7	3	1	14		6		
Bone	C	1		1										1							
Constantine	C	52	34	57	6									1	3			5	4		
Philippeville	C	9	6	1																	
Oran Department	C	28	39	8	4	5					1				1			2	2		
Southern Territories	C	62	21																		
Australia:																					
Brisbane	C		1	1							1										
Queensland	C	1		4																	
Bolivia. (See table below.)																					
Bulgaria. (See table below.)																					
Chile	C	49	190	338	90	67	53	33	23	36	18										
Antofagasta Province	C	5	5	7	1			1		2	1										
Concepcion Province	C			2			2		1		2										
Curico Province	C	1		1																	
Nuble Province	C			3	1	3	3				1										
Santiago Province	C	37	102	311	84	59	45	27	19	16	11										
Valdivia Province	C	1	5		1			3		7											
Valparaiso	C	1		5	1		1				3		1		1	1					
China (see also table below):																					
Dairen	C	2		2	3	2					1				1						
Hankow	C	1	1																		
Shanghai	C	2	12	49	9	9	6	11	10	16	9	11	5	5	4	3	6	3	14		
Tientsin	C	1																			
Chosen (Korea). (See table below.)																					
Egypt:																					
Alexandria	C	26	12	4		1		1					1			1					
Asyut Province	C	15	5	1	1				1	1											
Beheira Province	C	64	21	33	9	2	3	3		3					2						1
Beni Suef Province	C	1		1	1			1							1						

Cairo	C	9	5	1				2							1				1		
Dakahliya Province	C	196	141	77	4	8	3			1			2	1							
Faiyum Province	C									1											
Gharbiya Province	C	216	112	130	4	3	6	4	4	7					1						
Girga Province	C	31	26	7	2		2		2	3			1								
Giza Province	C	22	28																		
Kalyubiya Province	C	45	26		4	1				1			2								
Minufiya Province	C	141	65	58	6	3	5	2		1											
Port Said	C					3															
Qena Province	C	21	6		1																
Sharkiya Province	C	24	24	10	2										1						
Suez	C								1	1					1		1				
Provinces	C	828	461	330	38	21	18	10	8	22	6	2	6	1	5	4	2		1	1	
Eritrea: Hamasien	C		5																		
Guatemala. (See table below.)																					
Hawaii Territory: Honolulu	C	1	1	3		1		1			2	4	6	3	1	2			2		
Hungary	C			1								3				2	2				
India: Coorg Province	C		3											4							
Iran	C	18	13																		
Tabriz	C		10	4	1	1	10					2					2				
Iraq	C			5																	
Arbil Province	C	1	4		4																
Baghdad	C	2	1	5	1			2	4		1										
Kirkuk Province	C	7																			
Irish Free State: Louth County—Drogheda	C			5																	
Libya. (See table below.)																					
Lithuania. (See table below.)																					
Mexico (see also table below):																					
Guadalajara	D									1				1							
Mexico, D. F.	C	13	21	26						7							1				
Monterrey	C	1	3	5			1			1	1		1								
Saltillo	C		1																		
San Luis Potosi	D	1													1			1		2	
Torreon	D	1		4											1						
Morocco	C	145	87	21	3									3		2					
Casablanca	C		1	1																	
Nigeria: Kano Province	C			1																	
Palestine:																					
Haifa	C	4	3	3			1	2		4	3	1		4	4	4	4	4		5	
Jaffa	C	2	3	7	1			5	4		6	4		5	8		8	3		3	6
Panama Canal Zone. (See table below.)																					
Peru. (See table below.)																					
Poland	C	437	327	186	24	18															
	D	12	13	6	1	1															
Portugal. (See table below.)																					
Rumania. (See table below.)																					
Spain. (See table below.)																					
Straits Settlements: Singapore	C										1										
Trans-Jordan	C	9	1	1																	1

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended—																
					August 1939				September 1939					October 1939				November 1939			
					5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25
Tunisia:																					
Tunis	C	39	18	30	1	2	3	1							1			1			
Provinces	C	1,006	967	998	109	52	44	29				[1] 31		10	24	23					
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Venezuela. (See table below.)																					
Yugoslavia	C	62	35	26	1	4				2	3	2	3	1	1	2	2				
On vessel: S. S. *Normandie* at Plymouth	C			1																	

Place		May 1939	June 1939	July 1939	August 1939	September 1939	October 1939
Bolivia:							
De Beni Department	C			2			
La Paz Department	C	11	7	4			
Oruro Department	C	1		3			
Potosi Department	C	2	4	2			
Santa Cruz Department	C	2		1			
Bulgaria	C		8		16	4	
China: Manchuria—Harbin	C	16	14				
Chosen (Korea)	C	290	156	22	32	15	
Guatemala	C	4	8	9	21	46	2
Libya	C			1	26	7	
Lithuania	C	6		10	1	1	
Mexico (see also table above):							
Aguascalientes State	D		[2] 4		[3] 4		
Chihuahua State	D		[2] 1				
Coahuila State	D		[2] 2		[3] 5		
Durango State	D		[2] 2		[3] 4		
Guanajuato State	D		[2] 7		[3] 12		
Guerrero State	D		[2] 2				
Hidalgo State	D		[2] 15		[3] 19		
Jalisco State	D		[2] 3		[3] 7		
Mexico, D. F.	C		27	31		25	
	D		11	5	[3] 9	3	
Mexico State	D		21		[3] 17		
Michoacan State	D		[2] 10		[3] 5		
Mexico—Continued.							
Nuevo Leon State	D				[3] 1		
Oaxaca State	D		[2] 22		[3] 16		
Puebla State	D		[2] 24		[3] 24		
Queretaro State	D		[2] 4	1	[3] 1		
San Luis Potosi State	D		[2] 2		[3] 2		
Sonora State	D		[2] 2		[3] 1		
Tabasco State	D		[2] 1				
Tlaxcala State	D		[2] 2		[3] 3		
Vera Cruz State	D		[2] 3		[3] 3		
Yucatan State	D				[3] 1		
Zacatecas State	D		[2] 17		[3] 14		
Panama Canal Zone	C	1	1			1	
Portugal	C			5	1	3	
Rumania	C	40	75	13	7	10	23
Spain	C	14	9	7		8	
Turkey	C	49	35	15	1	11	
Istanbul	C		3			2	3
Union of South Africa:							
Cape Province	C	127		132	115		
Natal	C	7	7	12	1		
Orange Free State	C	4	4	5			
Transvaal	C	13	13	12	24		
Venezuela: Bolivar	C	3			3		2

[1] For 4 weeks.
[2] For May and June.
[3] For July and August.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Apr. 30–May 27, 1939	May 28–June 24, 1939	June 25–July 29, 1939	Week ended—															
					August 1939				September 1939					October 1939				November 1939	
					5	12	19	26	2	9	16	23	30	7	14	21	28	4	11
Brazil: [1]																			
Amazonas State	D			[2] 1															
Bahia State	D			[2] 1															
Espirito Santo State	D	[2] 1																	
Para State	D	[2] 1		2															
Cameroon: Bafia	C				[3] 1														
Colombia: Antioquia Department:																			
Caracoli	D		1	1															
San Carlos	D			2					1		1				1				
French Equatorial Africa:																			
Bangui	C											[4] 1							
Gabon	D			1															
French Guinea	C		2																
Gold Coast	C		1																
Ivory Coast [5]	C	[6] 5	[7] 9												1			1	
Nigeria [8]	C			1				[4] 1										1	[4] 1
Niger Territory:																			
Dosso	C																		3
Konni Circle	C		3																
Tahua	C	[4] 1																	
Senegal:																			
Bambey	C		1																
Dakar	C																	[4] 1	
Diourbel	C		6																
Louga [9]																			
Ziguinchor	C		10																
	D		5																
Sudan (French): Bandiagara	C		1																
Togo (French mandate): Anecho	C															1			

[1] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[2] Jungle type.
[3] Exact date not given.
[4] Suspected.
[5] During the week ended December 2, 1939, 1 suspected case of yellow fever was reported on Broumia Plantation near Abengourou, and 1 case of the same disease was reported near Daloa, Ivory Coast.
[6] Includes 1 suspected case.
[7] Includes 4 suspected cases.
[8] During the week ended December 9, 1939, 1 fatal case of yellow fever was reported in Ebba River, Nigeria.
[9] During the week ended December 9, 1939, 1 suspected case of yellow fever was reported in Louga, Senegal

X

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